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ORGANISATION OF THE AGRICULTURAL INDUSTRY.

Activities of the Provisional Council of Agriculture.

A Record of Progress and Achievement.

The Fourth Meeting of the Provisional Council of Agriculture was held on 20th July, and a complete record of its Proceedings is set out hereunder.

I.

The fourth meeting of the Provisional Council of Agriculture was held on 20th July, 1922.

Since the previous meeting of the Provisional Council, the Administrative Standing Committee had met twice—namely, on 28th June and 12th July; the Dairying Standing Committee had met on 13th and 14th July, and the Fruit Standing Committee had met on 12th July. The Transport Standing Committee held its first meeting on 13th July, when Mr. J. W. Davidson (Commissioner for Railways) was appointed Chairman.

The Administrative Committee reported that, under authority of a resolution passed at the last Council meeting, the Committee had taken the necessary steps to appoint Provisional Organisers, as follows:—

No. of District.	Electoral Divisions Comprised.	Name of Organiser.
1	Cairns, Chillagoe, Cook, Eacham, Herbert	Mr. Harvey Jurd
2 and 3	Bowen, Kennedy, Mundingburra, Townsville, Charters Towers, Queenton	Mr. D. V. Hannay
5 and 6	Fitzroy, Mt. Morgan, Normanby, Keppell, Port Curtis, Rockhampton	Mr. T. Ritchie
7	Bundaberg, Burnett, Musgrave	Mr. R. J. Webster
8	Burrum, Gympie, Maryborough, Nanango	Mr. T. J. O'Connell
9	Cooroora, Wide Bay	Mr. A. S. Douglas
10A	Aubigny, Ipswich, Lockyer, Bremer ..	Mr. J. S. Mickan
10B	Cunningham	Mr. J. McMaster
11	Bulimba, Logan, Murrumba, Nundah, Oxley, Stanley (also *pro formâ* Metropolitan Constituencies)	Mr. J. F. Dowd
12	Albert, Fassifern, Rosewood	Mr. R. Wight
13A	Pittsworth, Toowoomba, Toowoomba East	Mr. W. T. Harris
13B	Drayton	Mr. W. Gargett
14	Carnarvon, Warwick	Mr. W. Ranger
15	Dalby, Maranoa, Murilla	Mr. H. McAnally

The Council passed the following resolutions:—

Provisional Organisers—

(1.) That the action taken by the Administrative Committee in this matter be confirmed.

(2.) That in view of the fact that District No. 4 (Mackay and Mirani) is already well organised from the producers' viewpoint, the canegrowers' representatives on each of the Local Cane Prices Boards be asked to convene meetings for the purpose of forming Local Producers' Associations, subsequently appointing delegates to the District Council.

(3.) That in respect to canegrowers in other districts, arrangements similar to those indicated in (2.) above be made, as far as practicable, thus enabling the provisional organisers to concentrate more fully on the primary industries still to be organised.

(4.) That the purport of (3.) above be suitably communicated to the Provisional Organisers; and that they be asked to act in accordance with the spirit thereof.

Council Delegates—

(5.) That, as the provisional organisers have now been appointed, and it will no longer be necessary for the Council to avail itself of the services of the Council delegates, they be cordially thanked for their services in visiting districts and making known the aims and objects of the scheme for the organisation of the agricultural industry.

Chief Dairy Expert—Membership, Provisional Council—

(6.) That it is noted that the Dairy Committee strongly urges the appointment of Mr. E. Graham, Chief Dairy Expert, as a member of the Provisional Council of Agriculture and of the Dairying Standing Committee, in view of—

(*a*) His expert knowledge of the problems connected with all phases of the dairying industry;

(*b*) The advantage to the dairying community of having him closely associated with the business transactions of the Council.

(7.) That in view of the above circumstances it be a recommendation to the Government to appoint Mr. Graham as a member of the Provisional Council.

(8.) That it is noted that, following upon the Conference with the Premier on the 15th June, 1922, the Dairying Industry Advisory Board was disbanded; that Messrs. Douglas, McAnally, and Sloan had retired from the Council; and that Messrs. J. E. Dean, H. Keefer, W. Purcell, and T. Plunkett (formerly members of the Dairying Industry Advisory Board) were appointed as dairy representatives on the Provisional Council.

Personnel, Certain Committees—

(9.)—

(*a*) That in view of the retirement from the Council of Mr. Douglas, Mr. McAnally, and Mr. Sloan, their names be removed from the list of members of the Standing Committees to which they were appointed.

(*b*) That it is noted that the personnel of the Dairy Committee is now as follows,—namely, Messrs. J. E. Dean, H. Keefer, J. Purcell, W. Purcell, T. Plunkett, and J. T. Tod, with Mr. E. Graham, Chief Dairy Expert, as associate member.

(*c*) That Mr. H. Keefer be appointed as a member of the Transport Committee, in the room of Mr. Douglas, retired.

(*d*) That Mr. T. Plunkett be appointed as a member of the Wheat and General Agriculture Committee, in the room of Mr. McAnally, retired.

Associate Members, Publicity Committee—

(10.) That the Editor of the "Education Office Gazette" and the Editor of the "Queensland Government Mining Journal" be appointed as associate members of the Publicity Committee. (The Editor of the "Queensland Agricultural Journal" had been previously appointed a member of this Committee.)

Director, Queensland Producers' Association—

(11) That, in the opinion of this Council, Mr. R. L. Macgregor is the most suitable candidate (from amongst the 72 applicants for the position) for appointment as Director of the Queensland Producers' Association.

(12.) That it be reported to the Government that the Council unanimously recommends the appointment of Mr. R. L. Macgregor to the position in question, under the conditions outlined in the Primary Producers' Organisation Bill which is now before Parliament.

[Mr. Macgregor has telegraphed his acceptance of the position, and has been requested to take up duty as soon as possible.—Ed.]

II.

Activities of the Provisional Council in relation to Proposals for the benefit of producers.

1. *Income Tax Relief for Farmers—*

That in connection with a recommendation recently submitted by the Queensland Farmers' Alliance, to the effect that "any farmer whose farm is mortgaged and who is liable to pay more than £25 in interest per annum, and the unimproved value of whose property does not exceed £2,000, shall be allowed double the amount of interest payable as a deduction from Income Tax assessment," it is noted that advice has been received from the Under Secretary to the Treasury that in an amendment of the Land Tax Act which it is proposed to introduce during the current session of Parliament, certain relief will be given to farmers owning land.

2. *Herd-testing.*

(*a*) That this Council, recognising the importance of the improvement of dairy herds by herd-testing, recommends that the services of officers of the Department of Agriculture and Stock be made available, to the fullest extent, to Associations formed for the purpose of furthering the principles of herd-testing;

(*b*) That it be a recommendation that Mr. E. Graham, Chief Dairy Expert, be asked to prepare for submission to the next meeting of the Dairy Committee a concrete scheme to give effect to the foregoing recommendation;

(*c*) That the Herd-testing Associations which conferred recently with the Dairy Committee be suitably advised to the foregoing effect.

3. *Factory returns required by the Department of Agriculture—*

That the Chief Dairy Expert be asked to give further consideration to the matter of returns supplied from factories relating to cream of low-grade quality.

4. *Dairy Inspectors—*

That the Council is of opinion that the present staff of dairy inspectors is not sufficiently large to cope with the volume of work entailed by the new Dairy Produce Act, and recommends that the Department of Agriculture be requested to appoint a number of additional inspectors.

5. *Cold Store at Hamilton—*

(*a*) That the Minister for Works be urged to expedite the building of the cold stores, as the recent general rains make possible early and heavy production in the dairying industry, which will necessitate the provision of extensive storage.

(*b*) That the four rooms which it is anticipated will be in readiness by December, should be utilised for the storage of dairy products. Fruit and other produce should be placed in the cold stores at Roma street.

(*c*) That the Council is of opinion the control of cold stores at Hamilton should be vested in the Department of Agriculture and Stock.

6. *Minimum Load of Butter—*

That the Dairy Committee and the Transport Committee confer on the question of reducing the minimum truck load of butter from 3 to 2 tons.

7. *Question of Introduction of Co-operative Companies Bill—*

(*a*) That in view of arrangements already made by the Dairying Industry Advisory Board, representatives of co-operative companies be requested to meet the members of the Council in Conference on Friday, the 21st instant.

(*b*) That the Council be represented at the Conference by—

(i.) The several members of the Dairy Committee;

(ii.) Messrs. Ellison and Howe (fruit representatives);

(iii.) Messrs. Batchelor, Powell, and Pritchard (sugar representatives).

8. *Plans of Dairy Buildings, &c.—*

That it be a recommendation to the Department of Agriculture to investigate and draw up plans and specifications (to be on the most economic and efficient basis) of dairy buildings, yards, pig-styes, sheds, milk stands, &c., with a view to making the plans available for distribution to dairy farmers; such buildings to comply with the provisions of the Dairy Produce Act.

9. *Conservation of Fodder—*

That the New South Wales Government be requested to furnish a copy of the scheme relating to the conservation of fodder, which it has now under consideration.

10. *Cream Containers—*

That the Co-operative Dairy Companies' Association be requested to investigate the matter of securing suitable rimless cream containers, with a view to recommending their adoption in place of kerosene tins at present widely in use.

11. *Director of Fruit Culture—*

(*a*) That the Council strongly recommends the appointment of a Chief Instructor of Fruit Culture to act as deputy to the Director, to perform a reasonable amount of field work and to assist in the adequate supervision of the field staff.

(*b*) That with a view to obtaining a suitable man the position be advertised throughout Australia.

12. *Citriculturist—*

That the Public Service Commissioner be requested to consult the Council of Agriculture when applications are being invited for this position.

13. *Visit of Tasmanian Government Fruit Expert—*

That as Mr. Ward, Tasmanian Government Fruit Expert, will be visiting Brisbane in August next, the Department of Agriculture be requested to endeavour to arrange for an extension of his visit to the Stanthorpe district and for a lecture by him on deciduous fruit growing.

14. *Banana Pool—*

(*a*) That the Department of Agriculture be requested to take a ballot of all banana growers in Queensland who have a minimum area of not less than 1 acre under bananas; and that the ballot papers contain the following questions:—

(i.) Are you in favour of a Compulsory Banana Pool?

(ii.) Would you approve of the Pool being conducted by the Southern Queensland Fruitgrowers' Society?

(*b*) That the growers be requested to return their ballot papers so as to reach the Department of Agriculture not later than the 31st August, and that they be asked to furnish at the same time—

(i.) Name:

(ii.) Address:

(iii.) Number of acres under bananas:

15. *High Price of Fertilisers—*

That it is noted that the prices which are being charged to growers for manures are very high, and that the matter be brought suitably under the notice of the Prices Commissioner.

16. *Agricultural Machinery—*

That it be a recommendation to the Council that the several Standing Committees concerned list for discussion the matter of the high cost of agricultural machinery.

17. *Standards for Apples—*

(*a*) That it is noted that the Stanthorpe District Council of Fruitgrowers has approved of following standards for apples:—

Grade A.—Apples to be well formed specimens of one variety, of uniform size, free from visible bitter pit, black spot, and hail marks, but case may contain not more than 10 per cent. of specimens with slight blemishes from insect and limb rub. Apples to be not less than 2¾ inches in diameter.

Grade B.—Apples to be free from visible bitter pit, black spot, and hail marks, but case may contain not more than 20 per cent. of specimens with blemishes from insect and limb rub. Apples to be not less than 2¾ inches in diameter.

Grade C.—Apples to be free from visible bitter pit and black spot, but case may contain 100 per cent. of specimens with insect, limb rub, and hail marks. Apples to be not less than 2 inches in diameter.

Grade D.—Apples to be free from visible bitter pit and black spot, but case may contain 100 per cent. of specimens with insect, limb rub, and hail mark. Apples to be not less than 1¾ inches in diameter.

Apples of Grades A, B, and C shall be properly packed according to the diagonal pack.

Apples of Grade D shall be so packed that the outer layer or shown surface shall be a true indication of the average grade of the fruit throughout the package.

The name of the variety and the size shall be marked on the outside of every case.

(*b*) That it be a recommendation to the Department of Agriculture to take the necessary action to have these standards adopted.

18. *Rough Handling of Fruit—*

That it be a recommendation to the Department of Agriculture to introduce legislation to give effect to the following recommendations:—

(*a*) No case or cases of fruit shall be stood or walked upon by any person except upon a plank of not less than 1 inch in thickness and 6 inches in width first placed on such case or cases for that purpose;

(*b*) No person shall handle, stack, load, or unload any fruit whereby such fruit is subjected to shock sufficient, in the opinion of an inspector, to bruise or injure such fruit, whether such fruit be actually bruised or injured or not thereby.

(*c*) Any person committing a breach of any regulations under "The [*name of Act*] Act" shall upon conviction be liable to a penalty not exceeding ten pounds.

19. *Diseases in Plants Act—*

That the following particulars be brought under the notice of the Department of Agriculture:—

(*a*) The Council is satisfied that the Government has ample power under the Act to deal effectively with any disease, but considers that burying of fruit-fly-infested fruit is not a practically effective mode of destruction.

(*b*) Section 5 of the Act, dealing with the appointment of inspectors, reads, "The Governor in Council may from time to time appoint such qualified persons as may be deemed necessary to be inspectors under this Act," &c. In the opinion of the Council the necessary qualifications should be laid down by regulations under this Act.

20. *Administration, Diseases in Plants Act*—

That it be a recommendation to the Department of Agriculture—

(*a*) That regulations be issued defining the qualifications and duties of inspectors under this Act;

(*b*) That no inspector be appointed in future until he has passed a practical examination in acknowledged methods of control of diseases and pests, and that he be certified accordingly;

(*c*) That the Entomological Branch each month supply to the "Queensland Agricultural Journal" an article or current notes upon all particular diseases and pests which may require treatment, and the nature of that treatment during the ensuing month;

(*d*) That inspectors have full powers to compel a grower to pick up and destroy all fallen fruit—at once if necessary;

(*e*) That inspectors have full powers for carrying out an immediate prosecution; but to avoid victimisation, it is advisable when practicable to call in another inspector or competent officer as a witness;

(*f*) That it is desirable that the Council of Agriculture should be consulted when appointments of inspectors are being made.

(*g*) That the Stanthorpe district be divided into three areas, and one Diseases in Plants Act inspector be resident in and responsible for each area;

(*h*) That a speedier mode of travelling be recommended. The use of motor cycles is desirable.

21. *"Bunchy Top" in Bananas*—

That in view of the particulars contained in a recent letter from the Secretary, Currumbin Fruitgrowers' Association, the Department of Agriculture be requested to cause immediate inquiries to be made into Mr. Marks's claim that he has discovered the cause and cure for "bunchy top" in bananas.

22. *Railway Trucks—Carriage of Fruit*—

That the following particulars be noted from the Progress Report of the Transport Committee:—

(*a*) That there are now 496 louvred wagons in use in Queensland, that thirty more are under construction, and that all box wagons built in future will be of the louvred type.

(*b*) That the New South Wales Railway Department also uses louvred wagons, but because of the colder climate in the New England district tarpaulins are used to cover the fruit in the leading ends of the wagons in winter time.

(*c*) That a request will be made by the Railway Department of this State to the New South Wales authorities to extend the covering to the sides as well.

23. *Shipping Shed at Wallangarra*—

(*a*) That it is noted from the report of the Transport Committee that the bulk of the fruit arrives at Wallangarra in train loads and is taken away in train loads, the Queensland wagons being placed opposite those of New South Wales. The building of a shed to cover the whole of the transhipment road which would be necessary to avoid shunting would be very costly. The rainfall records at Wallangarra are not high.

(*b*) That it is noted that the Commissioner for Railways will make inquiries regarding the supplying of collapsible covers to protect the fruit during the course of transhipment.

24. *Railway Checkers at Loading Centres*—

That it is noted from the report of the Transport Committee that, where the railway staff is available, clean receipts will be given for consignments. To provide checkers at every small station would necessitate increased charges, but senders' count receipts will be eliminated as far as possible.

25. *Conveyance of Fruit to Western Australia*—

(*a*) That it is noted that the railway freight between Brisbane and Perth will be £10 11s. 6d. per ton plus inspection fees in 6-ton lots.

(*b*) That it is also noted that the Commissioner for Railways will make further inquiry as to the time necessary for the conveyance of fruit where inspection charges will be levied in all the States.

26. *Delay—Consigning of Fruit to Adelaide—*

That it is noted that this matter is in the hands of the Victorian and South Australian railway authorities.

27. *Railway Rates for Fertilisers—*

(*a*) That in connection with this matter the following circumstances have been noted:—Comparison of Queensland rates with those of New South Wales shows that up to 200 miles the comparison is favourable to Queensland, but over 200 miles the comparison is more in favour of New South Wales.

In the latter State there cannot be much traffic over long distances, so that the advantage in the rates would not be much availed of.

(*b*) That it is also noted that the Transport Committee has agreed that the Chairman (the Commissioner for Railways) should recommend a reduction of 15 per cent. in the Queensland rates for distances over 200 miles, but not less than the present rate for 200 miles.

(*c*) That the Transport Committee be asked to give further consideration to this matter at a later date, with a view to ascertaining whether a still further reduction may be possible in the direction indicated.

28. *Use of Refrigerated Trucks for Fly Infected Fruit—*

(*a*) That in connection with a request from the Stanthorpe district for refrigerated cars for the conveyance of stone fruit from Stanthorpe to Brisbane, it is noted that the Transport Committee is of opinion that, if refrigerated wagons are provided, higher rates should be charged. Such wagons would be required in the height of the butter season and the Railway Department has no refrigerated wagons to spare during the heavy butter season. The Commissioner for Railways is prepared, however, to experiment with the use of a wagon during the coming season;

(*b*) That it is also noted that this matter will receive further consideration by the Transport Committee.

29. *Entomological Work—*

That Messrs. Hives, Quodling, Ranger, and Short be appointed as the representatives of the Council on the Committee (consisting of representatives of the Department of Agriculture, the University of Queensland, and the Council of Agriculture) which it is proposed to form for the purpose of preparing a scheme for the possible correlation of the entomological work so far as these three bodies are concerned.

30. *Draft Bill—Compulsory Pools—*

(*a*) That it is noted from a statement made by the President at this meeting that a draft Bill has been prepared;

(*b*) That, in accordance with the President's suggestion, it be a recommendation to the Minister for Agriculture to cause each member of the Council to be furnished with a copy of the proposed Bill, on the understanding that the particulars will be regarded by members as confidential; and that an opportunity be afforded to the Council to consider the measure at its next meeting.

31. *Primary Producers' Organisation Bill—*

The Primary Producers' Organisation Bill was considered by the Council, and it was decided to suggest the following amendments:—

(*a*) Definition of "Primary Producer" to be amended to read:—Every person engaged in the occupation of . . . . and any class of persons not being persons engaged in primary production as employees on wages or piecework rates.

(*b*) *Quorum at Council Meetings—*

Clause (4) (7) to be amended, to read as follows:—"Subject to this Act a majority of members of the Council shall constitute a quorum at any meeting of the Council."

THE DIRECTOR, QUEENSLAND PRODUCERS' ASSOCIATION.

MR. R. L. MACGREGOR'S CAREER.

Mr. Richard Lewis Macgregor is a native of Scotland, and is 36 years of age. He was educated at the Glasgow High School and later at the Glasgow and West of Scotland Technical College. His early business training was acquired at an old-established Scottish county house, where he was trained in banking and law. This house managed the agricultural estates of the late Sir Donald Currie, and Mr. Macgregor was attached to that department and had opportunities of becoming familiar with the theory and practice of modern agriculture, including stock and crop marketing.

At the age of 23 Mr. Macgregor accepted the position of assistant manager of the Gairkhata Estates, Bengal, India. This company controlled several large landed estates, and a large factory. Upwards of 5,000 people were connected directly or indirectly with the company, which undertook housing, water supply, roads, drainage, &c., in addition to works connected with cultivation and manufacturing. While in India Mr. Macgregor had full opportunity afforded him of mastering every detail of business organisation and the control of a large staff. Being desirous of coming to Australia, Mr. Macgregor, after completing his term of engagement with the Bengal company, declined an offer of extended service at increased remuneration, and came to Australia.

Arriving at Perth (Western Australia), he became secretary to Mr. J. Hawter, of Hawter's orchards and nurseries. He there acquired an intimate knowledge of every branch of fruitgrowing, including the growing of young trees—citrus and deciduous—as well as the growing of fruit for the export trade. He relinquished that position to take up wheatgrowing on his own account. At the time he was engaged in wheatgrowing, the agriculturists in the western State were passing through a succession of hard times. The Farmers' Co-operative Company had just been brought into being, and was operating in a very small way under the management of Mr. Stirling Taylor, who is now Director of the Bureau of Commerce and Industry. Mr. Macgregor formulated a scheme for the extension of the co-operative principle in the agricultural districts in the State, and, on outlining the scheme to Mr. Taylor, was invited by the latter to join him in the carrying out of the project. That success attended his organising efforts in this direction will be manifest when it is stated that the co-operative organisation in the western State now embraces the central wholesale house, the Westralian Farmers Limited, and some ninety odd local co-operative companies engaged in various kinds of co-operative undertakings. Starting eight years ago with a capital of £2,000, the Central company alone now has a capital and reserves amounting to approximately £100,000. When the scheme had been launched, Mr. Macgregor was invited by Mr. Taylor to undertake the management of three of the principal departments of the organisation. In the year 1917 the Farmers' Co-operative Company was successful in securing appointment as sole wheat-acquiring agents in the marketing of wheat for the Western Australian Government. Wheat had to be acquired at some 300 sidings, and large quantities had to be stored for long periods, the work entailing a large inside and outside staff. Owing to the magnitude of the undertaking, Mr. Macgregor was placed in control of that department and at the present time is manager of the wheat department. Mr. Macgregor is also the originator of the present scheme for the bulk handling of wheat in Western Australia, and, in addition to being manager of the wheat department of the Westralian Farmers Limited, is secretary to the Western Australian Grain Growers' Co-operative Elevators Ltd., the company which has been floated to carry out the scheme. He is entirely familiar with every aspect of that question.

In the year 1919 he was sent by the Farmers' Co-operative Company as sole representative to Europe to inquire into the marketing of agricultural products. Reports of his investigations were made available to the Commonwealth Government, and in that connection the Director of the Bureau of Commerce and Industry wrote him as follows:—

> "I want to compliment you on both the wheat and fruit reports; the knowledge which you have gained will be invaluable to the whole industry, and should, when it becomes known, dissipate much of the doubt the companies have regarding the success of their own selling schemes."

While overseas, Mr. Macgregor took the opportunity of again familiarising himself with the methods and practices of the great English and Scottish Co-operative Wholesale Societies, and furnished reports to his principals dealing with these concerns.

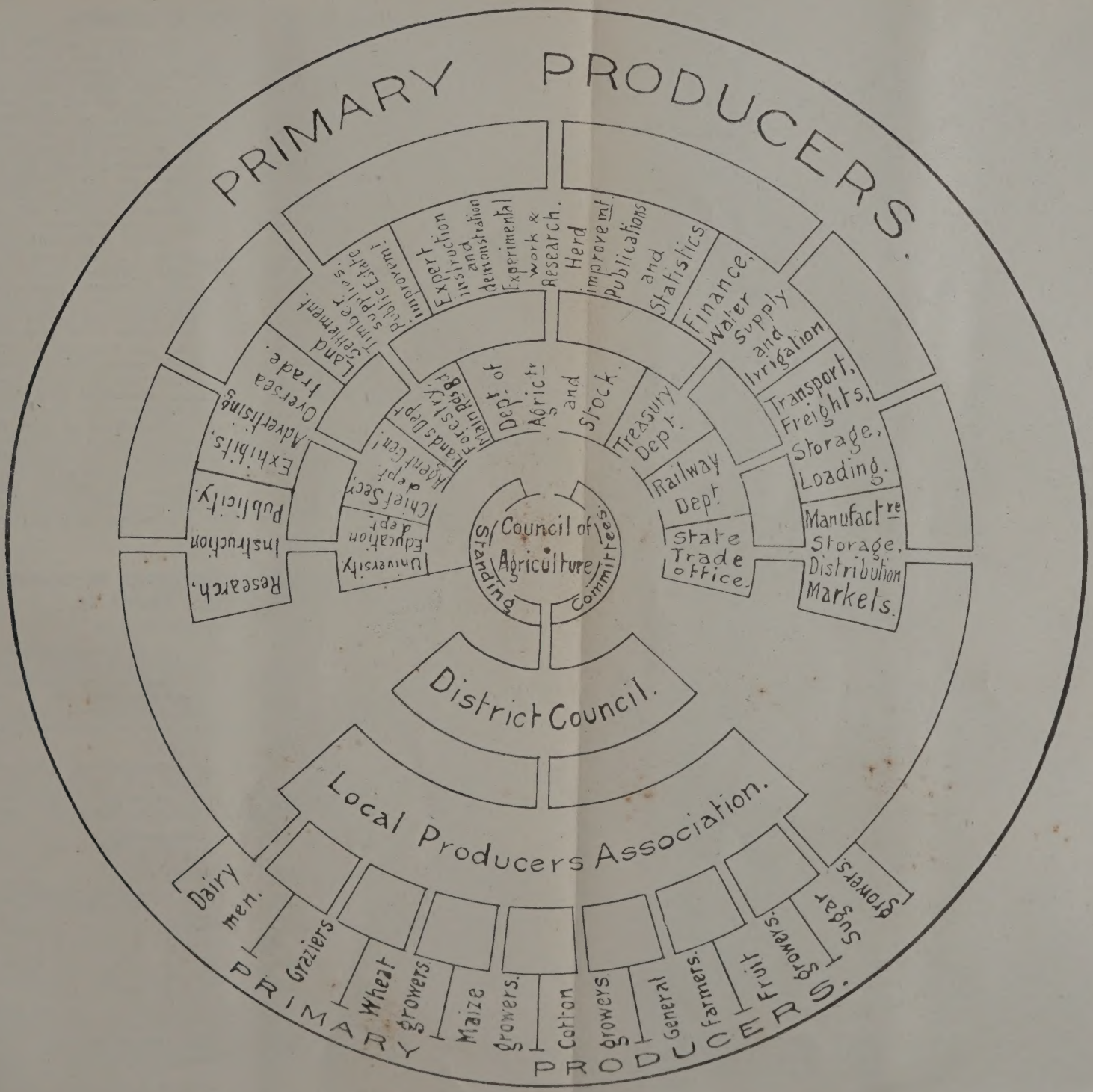

PLATE 8.—DIAGRAM SHOWING THE PROPOSED ORGANISATION OF QUEENSLAND PRODUCERS.

CASSAVA-GROWING AND MANUFACTURE.

In reply to a correspondent, who asks for some information concerning the cultivation of cassava and the method of extracting the farina, we republish notes on the subject which last year formed the subject of an article supplying whatever information we could obtain as to cultivation, and suggesting the use of the same machinery as that used by arrowroot-growers in preparing the arrowroot of commerce.

There are two varieties of the cassava (or, as it is known in Spanish America, manioc), viz., the sweet and the bitter, the latter bearing the botanical name of *M. utilissima*, the former *M. Aipi*. The more important is the bitter cassava, and this is the variety universally grown for the manufacture of tapioca. Its roots grow to a length of 2 feet, and weigh each about 8 lb. The average length is about 1½ feet. This root is yellow, and both root and stems contain a milky, powerfully poisonous juice. This poison, fortunately, is exceedingly volatile, so much so that if the sliced roots are exposed to the sun for a few hours the poison vanishes and the roots may then be safely fed to stock.

The sweet variety is distinguished from the bitter in that the roots are much smaller and of a reddish colour, and contain no poison whatever. They may be used to make tapioca, without any previous preparation. The return is, however, too small to make it worth while to grow this variety. Some years ago a sugar-planter in the North of Queensland planted a few acres of bitter cassava, but allowed it to die out owing to the want of a machine by which it could be treated.

We are informed that cuttings may be obtained by application to the Superintendent of the Yarrabah Mission Station, *viâ* Cairns, Queensland. The cuttings, if available, would be sent sealed at both ends, which will ensure their vitality on arrival at their destination. From the same source it may be that you could obtain information as to the necessary machinery.

It should be noted that the cassava plant thrives best on the coast land. There the roots yield a maximum of starch, whereas if grown further inland in dry areas the roots become more woody and poorer in yield of starch. Scrub land soil is to be preferred. In a damp soil the roots degenerate or rot away.

The machinery for extracting the farina is very similar to that used in the preparation of arrowroot, and is very simple. It can be supplied by any manufacturer of machinery in Queensland or in the other States of the Commonwealth.

A SUMMARY OF EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS—III.

By H. T. EASTERBY, General Superintendent.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May "Journal." The second instalment was an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, and appeared in the June issue. The third instalment treats of experiments in fertilisation.—Ed.

FERTILISER EXPERIMENTS.

A number of experiments with fertilisers have been carried out at the Sugar Experiment Stations. The first of these was to test the action of fertilisers upon crops cultivated in the ordinary way, and those receiving deep, thorough, and subsoil cultivation. The results of these are summarised hereunder:—

EXPERIMENTS WITH MIXED FERTILISERS.

MIXED MANURES OF NITROGEN, POTASH, PHOSPHORIC ACID.	ORDINARY CULTIVATION.		DEEP, THOROUGH, AND SUBSOIL CULTIVATION.	
	Cane per acre, English tons.	Sugar per acre, English tons.	Cane per acre, English tons.	Sugar per acre English tons
1. Fertiliser	31·6	4·0	52·1	7·2
2. No fertiliser	28·6	3·8	48·0	6·6
Difference	3·0	0·2	4·1	·06

The results from the application of a mixed fertiliser in these examples are not very great. It is noted that the manure gave a higher increase of return in cane, and

more notably in sugar, upon the "deep cultivation" land than where "ordinary cultivation" was practised. During the first nine months of the life of the cane in these experiments the weather was extremely dry and rainless. The cane under ordinary cultivation ceased growing several months before the deeply cultivatd cane did, which may account for the smaller use it made of the manure. Had rain been abundant, the fertiliser, with ordinary cultivation, would probably have given the highest results.

FERTILISER EXPERIMENTS WITH SINGLE ELEMENTS.

These experiments were carried out in order to try to determine the fertilising action of each of the individual chemical elements. The experiments were made in two series or in duplicate, and upon the "irrigated" and "non-irrigated" areas of cane. To economise space, the number of trials in each series are run together, and results given in average.

The results represent the actions respectively of nitrogen, potash, lime, and phosphoric acid, in comparison with results where no fertiliser was used:—

ACTION OF THE ELEMENTS ON NON-IRRIGATED CANE.

Fertilising Elements.	Weight of Cane per acre, in English tons.	Total Sugar per acre, in English tons.
1. Nitrogen	51·5	7·0
2. Potash	51·5	6·9
3. Lime	50·5	6·5
4. Phosphoric acid	48·9	6·7
5. No fertiliser	48·3	6·6

ACTION OF THE ELEMENTS ON IRRIGATED CANE.

Fertilising Elements.	Weight of Cane per acre, in English tons.	Total Sugar per acre, in English tons.
1. Nitrogen	48·9	6·7
2. Potash	49·5	6·7
3. Lime	46·7	6·1
4. Phosphoric acid	43·2	5·8
5. No fertiliser	40·5	5·9

The respective actions of the several elements are set forth in the above table. It is, in the first place, observed that the fertilising action throughout was notably greater in the series where irrigation water was applied than where the crop was grown by rainfall only. This result appears to confirm the observation made in connection with the "mixed fertiliser" results—viz., that, "had rain been abundant the fertiliser, apart from cultivation, would have given greater results." Nitrogen and potash not only give the highest results; they give practically identical returns in each of the two series—with and without irrigation. These results are strictly in agreement with the findings of the laboratory, the soil analyses having indicated that nitrogen and potash were the elements more emphatically in request.

The above experiments were made with plant crops only.

EXPERIMENTS WITH PLANT AND RATOON CROPS, 1906 TO 1909.

In the following tables are shown results from the use of mixed fertilisers in plant, first, second, and third ratoons upon irrigated and non-irrigated cane:—

Plots.	1906 PLANT CROP.			1907 1ST RATOON CROP.			1908 2ND RATOON CROP.			1909 3RD RATOON CROP.		
	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.
Irrigated ..	58·4	54·1	4·3	41·9	32·6	9·3	39·5	24·0	15·5	35·1	19·6	15·5
Non-Irrigated ..	50·7	47·4	3·3	42·4	31·7	10·7	38·8	24·1	14·7	35·9	19·8	16·1

These mixed manures were composed of 150 lb. nitrate of soda, 150 lb. sulphate of ammonia, 100 lb. sulphate of potash, and 300 lb. of superphosphate, per acre.

The increase in the plant crop, when the land had been freshly subsoiled and had been limed and green manured, was only small. The action of the deep ploughing combined with the lime would cause a large amount of the chemical plant food elements to be brought into a soluble and available condition for the use of the crop. The difference, therefore, between manured and unmanured cane in the plant crop was not very striking. When we come to the ratoon crops the results of manure are at once apparent, and the yields for manure are highly satisfactory.

EXPERIMENTS WITH MIXED MANURES AND SINGLE ELEMENTS.

The following experiments were carried out from 1911 to 1913, and the results are summarised below:—

CROP RESULTS TO DATE: MANURIAL EXPERIMENTS—PLANT, FIRST RATOON, AND SECOND RATOON CROPS, 1911, 1912, AND 1913.

Variety of Cane.	Manure Applied.	No. of Plot.	Plant Crop, 1911.		First Ratoon Crop, 1912.		Second Ratoon Crop, 1913		Total Yield of Three Crops.	
			Yield of Cane per Acre, in English tons	Yield of Sugar per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Sugar per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Sugar per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of Sugar per Acre, in English tons.
New Guinea 40..	Nitrate of soda ..	1	49·1	7·4	26·2	3·4	26·9	3·7	102·2	14·5
New Guinea 40..	Sulphate of ammonia	2	48·0	7·1	28·7	3·4	30·5	4·3	107·2	14·8
New Guinea 40..	Sulphate of potash..	3	47·4	6·8	24·9	3·4	24·2	3·4	96·5	13·6
New Guinea 40..	Mixed fertiliser ..	4	47·4	7·3	30·7	3·9	30·1	4·4	108·2	15·6
New Guinea 40..	No manure	5	42·0	6·5	18·6	2·7	18·1	2·8	78·8	12·0

The quantities applied per acre were as under—

Nitrate of soda	4 cwt.
Sulphate of ammonia	4 cwt.
Sulphate of potash	4 cwt.
Mixed fertiliser	4 cwt.

The mixed manure consisted of 172 lb. sulphate of ammonia, 69 lb. sulphate of potash, and 207 lb. of superphosphate. This was a very small dressing of mixed manure, but it gave the best result over the three crops.

The profit per acre for the mixed manure was considerably greater than for any other fertiliser used.

It has always been maintained that more payable results can be secured from the use of fertilisers containing the three elements—viz., nitrogen, potash, and phosphoric acid.

FERTILISER EXPERIMENTS WITH FIRST RATOONS OF D. 1135. AGE OF CANE, 13 MONTHS—BUNDABERG SUGAR EXPERIMENT STATION, 1914.

Plot No.	Manure applied.	Tons of Cane per Acre.	Tons of Total Sugar per Acre.	Tons of Pure Obtainable Cane Sugar per Acre.
1	Nitrate of soda, 4 cwt.	23·17	3·14	2·84
2	Sulphate of ammonia, 4 cwt.	24·56	3·45	3·16
3	Sulphate of potash, 4 cwt.	20·03	..	..
4	Meatworks, 6 cwt.	20·95	2·96	2·68
5	Mixed manure, 6 cwt. (nitrogen, potash, and phosphoric acid)	26·17	3·71	3·43
6	No manure	19·13	2·78	2·57

The above was one of the first experiments carried out with fertilisers on the Bundaberg Experiment Station, and was on a large scale. The fertilisers were applied to ratoons existing upon the station at the time of purchase. Due to the fact that the station was not taken over till the end of December, 1913, the fertilisers could not be applied till late in that month. This was followed by a comparatively dry period, and it was not till the following March that any real growing weather set in.

This had an adverse effect upon the manures generally, although the result of the mixed manures was, on the whole, satisfactory and in line with experience elsewhere.

Analyses of these canes were carried out by the nearest mill; but, due to an oversight, the cane from the sulphate of potash plot was not analysed, so that the sugar per acre cannot be given.

The following year mixed manure was applied to part of the second ratoons of the above crop, a part receiving no manure. The results were as follow:—

Treatment.	Yield of Cane per Acre, in English tons.	Yield of Commercial Cane Sugar per Acre, in English tons.
Mixed manure	29·75	3·82
No manure	22·17	2·94

Difference for manure—7.58 tons cane per acre.

At the Experiment Station, Bundaberg, excellent results were secured from the action of mixed fertilisers upon a first ratoon crop of standover D1135 in the year 1917, which was a very favourable season.

CROP RESULTS FROM EXPERIMENTS WITH AND WITHOUT MANURES—STANDOVER FIRST RATOON, D. 1135, 1917.

Plot No.	Treatment.	Age of Cane.	Weight per Acre, in English tons.	Yield of Commercial Cane Sugar per Acre, in English tons.
1	Mixed manure, consisting of sulphate of ammonia 1 cwt., nitrate of soda 1 cwt., sulphate of potash 1 cwt., and meat-works manure 1 cwt.	25 months	80·75	12·04
2	No manure	25 months	60·54	9·66

The difference made in the yield in the above experiment was 20.21 tons of cane and 2.38 tons of sugar per acre for the use of mixed manure. The total yield was very high, and goes to show how profitable standover crops of cane in the Bundaberg district can be when seasons such as 1917 are experienced.

Still better results were secured in the following year from the use of mixed fertilisers in the same proportions on the second ratoon crop.

CROP RESULTS FROM EXPERIMENTS WITH AND WITHOUT MANURES—D. 1135, SECOND RATOONS, 1918.

Plot No.	Treatment.	Age of Cane.	Weight of Cane per acre, in English tons.	Yield of Commercial Cane per acre, in English tons.
1	Mixed manure, consisting of sulphate of ammonia 1 cwt., nitrate of soda 1 cwt., sulphate of potash 1 cwt., and meat-works manure 1 cwt.	12 months	37·29	4·93
2	No manure	12 months	14·62	1·82

This shows a difference of 22.67 tons in favour of the manure.

The above experiment with fertilisers covered four crops—*i.e.*, plant, first, second, and third ratoons. A summary of the results are included below.

CROP RESULTS TO DATE OF EXPERIMENTS WITH AND WITHOUT MIXED MANURES.

Plot No.	Variety of Cane.	Treatment.	Plant Crop, 1915.		First Ratoon Crop, 1917 (Standover).		Second Ratoon Crop, 1918.		Third Ratoon Crop, 1919.		Average of Four Crops.	
			Yield of Cane per Acre, in English tons.	Yield of c.c.s. per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of c.c.s. per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of c.c.s. per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of c.c.s. per Acre, in English tons.	Yield of Cane per Acre, in English tons.	Yield of c.c.s. per Acre, in English tons.
1	D. 1135..	Mixed manure, consisting of sulphate of ammonia 1 cwt., nitrate of soda 1 cwt., meatworks manure 1 cwt., sulphate of potash 1 cwt. Subsoiling	21·90	3·37	30·75	12·04	37·20	4·93	16·13	2·40	39·02	5·68
2	D. 1135..	No manure	20·04	3·03	60·54	9·66	14·62	1·82	12·60	1·90	26·95	4·00

It will be seen from the above table that there was a net average increase of 12.07 tons of cane for the use of the mixed fertiliser, which paid exceedingly well.

(TO BE CONTINUED.)

SUGAR: FIELD REPORTS.

The Northern Field Assistant attached to the Bureau of Sugar Experiment Stations, Mr. E. H. Osborn, reports under date 6th July, 1922:—

"*Herbert River.*—A short visit was made to this district early in June. The weather conditions were then very dry, with fairly cold nights; in fact, a touch of frost was felt in the Stone River district one morning. The rainfall so far this year has been very unevenly distributed, as out of a total fall of 56.44 inches for Ingham and 62.01 for Halifax, nearly 70 per cent. fell in February and very small amounts since, and in consequence the cane generally has not made the growth that it should, and is "yellowing" in places. At the time of my visit a few good showers would have been of great benefit to the early planted cane (which, so far, looked very well), and also to help any cane along that showed signs of grubs. Although the latter are to be seen in isolated places, they do not seem to be any worse than last season.

"Borers were noticed in several places, and the absolute necessity for using only healthy cane when planting out cannot be impressed too strongly upon growers. It is gratifying to know that the C.S.R. Company at Macknade are now breeding Tachinid flies for liberation in borer-infested areas. Next year's crop has probably been planted in the following order:—H.Q. 426, Badila, and H.Q. 409. The company are also distributing to growers plants from New Guinea varieties known as Corambo, Nanemo, and Korpi. Canes from the South Johnstone Station are also being extensively tried out, those most in favour being Tableland, Badila, E.K. 1, E.K. 28, and Q. 813. The last-named was noticed as having given excellent striking results in the company's experimental plot at Macknade.

"Macknade started crushing on the 2nd instant, whilst Victoria hoped to commence about the 7th, and unless the weather keeps very dry or the grubs do much more damage than expected, the Herbert River district should certainly harvest a larger tonnage of cane than was put through in 1921. Plenty of labour was available for all work, and the company look forward to a fairly satisfactory season.

"*Cairns District.*—This district was reached on the 6th of June, and practically the same dry conditions as were prevailing on the Herbert were noticed here, except that although the Cairns rainfall was only 55.06 inches for the same period, it was better distributed than the Herbert River fall. Rain was, however, very badly needed, both for the very large area of young plant cane and also to keep the grubby cane going.

"Unfortunately, grubs have appeared over a wider and more scattered area than formerly. Several farmers generally affected have not suffered as much as in former years, whilst areas formerly free are now suffering to some extent.

"It is noticeable how much better D. 1135 stands up to grubs than either Badila or H.Q. 426, and in consequence the proportion of the former cane is on the increase. At Freshwater no signs of grubs, or, indeed, of any pest are to be seen, and the cane areas there present a healthy appearance, and some very fine cane is met with. The tram lines connecting the farm with Redlynch are now very nearly completed, and I understand that the cane haulage on the latter will be done by means of a couple of motor engines.

"With the present outlook it seems that probably 55,000 to 60,000 tons of cane will be railed to Hambledon from this centre. Great progress is being made in this particular part of the Cairns district. New homes are to be seen in every direction, and when the season starts, the Freshwater district will be a very busy place.

"*Mulgrave District.*—The Mulgrave Mill now presents a very busy scene. The extensive alterations are nearing completion, and the manager expects to handle a large crop. The old mill can hardly be recognised in the splendid plant that has taken its place.

"Planting has been carried out on a large scale this year, and a further acreage of land is still being prepared. Quite a large proportion of the recently planted cane is D. 1135. At Highleigh, Mr. Jno. Cannon has some very fine cane of this variety. He finished planting in October, and the cane when seen looked good enough for a 25 ton crop. Previous to planting, Mr. Cannon had used a couple of tons of burnt lime to the acre on this block, and, after planting, about 4 cwt. of mixed manure. At present Mr. Cannon is using two tractors on his large farm, and speaks most highly of the good work they are doing.

"*Babinda.*—The Babinda area in general is so porous that constant rain is needed to enable the cane to do its best. The dry spell ended just after the mill started crushing on the 15th, and 3.22 inches were registered between then and the 19th. The general appearance of the crops was rather backward, the ratoon in

particular being very poor. Owing to such a very heavy wet season last year, very little early planting was carried out, and the late-planted cane has still a long way to go. The recent dry spell had its advantages, however, as a large area of land was planted, some of which had struck very well. Although Badila is the principal cane grown here, with a proportion of D. 1135 and H.Q. 426, very many inquiries are being made as to the newer varieties, and a large number of growers have applied for plants from the Experimental Station at South Johnstone. E.K. 1, E.K. 28, Q. 903, and Tableland Badila seemed most in favour.

"A new tractor was also noticed on Mr. Treickel's farm on Babinda Creek, the owner remarking what good work he was now able to do. Grubs are certainly more scattered than in former years, but they have not done much damage this season.

"Borers are in evidence in a few places, but apparently not as much as formerly. Generally speaking, the district is a very prosperous and growing one, especially when one remembers that the sole school accommodation in 1914 was a small temporary building in the mill yard, whilst now the large school at Babinda is supplemented with schools at Mirriwinni and Bartle Frere, whilst a further school at Bellenden Ker is now practically ready to open. Surely this is a good argument for the continuation of the present sugar agreement and its bearing on the White Australia ideal.

"*Mossman.*—When this area was visited during the third week of June, the conditions of the crops, as a whole, were very good; and, as far as one could judge, the cane generally was more forward in growth than in any other sugar areas visited during the month. Very little damage has so far been caused by grubs, nor was the presence of the borer noted. Prior to my visit, some three weeks of dry weather had been experienced, but several light showers, resulting in the registration of 58 points for the week ending 27th instant, relieved the situation, and as the area of young cane was very considerable and the weather still warm, this fall was very beneficial.

"A certain amount of green manuring is being carried out, but very little lime has so far been used. The soil in most cases gives an acid reaction, and bulk samples sent to the Sugar Bureau for complete analysis emphasise the need of lime. So far, no satisfactory arrangements have been made to work the limestone deposit at the 7-Mile. Last year the mill crushed 62,000 tons of cane; and, with a slight increase in acreage for this season, it is more than likely that 70,000 tons will be the result of the 1922 crushing.

"As mentioned in previous reports, D. 1135, H.Q. 426, Badila, 24B (green Goru), B. 147, M.Q. 1, and 1900 Seedling are the principal canes grown in this area.

"Some good crops of D. 1135 were noticed in several places. At one farm a crop of sixth ratoons will again cut a 15-ton crop. The mill expects to start operations about the middle of July, and as it has had a thorough overhauling, and also had considerable additions to its plant, its work during the coming season should be most efficient. Plenty of good labour is available, and the management look forward to a successful season."

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report, dated 7th June, 1922, from the southern field assistant, Mr. J. C. Murray:—

"During June, 1922, the Mackay district was visited. This includes the sub-areas of Farleigh, Homebush, Sarina, Pinnacle, and Owens Creek, and areas in the environs of Mackay township.

"Taking the areas immediately around the city, it is noticeable that the cane has suffered greatly since last February from lack of rain. The different varieties are backward and parched-looking, although healthy, while the young plant cane has struck well, but the leaves present that whitish chlorotic appearance indicative of lack of sufficient nourishment. In many cases the growers, regarding the present standing crop, have not been persistent enough in their cultivation subsequent to planting, and the result is a very hard interspace, with a heavy growth of weeds.

"Regarding cane varieties that are making a good showing in this area, there are Q.970, D.1135, Q.458, Q.813, Malagache, H.Q.285, Q.1121, Q.855, N.G., 24B. Clark's Seedling and Badila also look well on many farms. No serious indications of disease were noticeable, nor was much apparent damage being caused in this locality by insect or fungoid parasites. A number of canes were arrowing or showing inclination thereto. The varieties appearing to arrow more freely than others were Uba and M.1900 Seedling.

"*Farleigh.*—On this area the soil is different to the pioneer flats, and, while inferior in some respects, appears to have better moisture-conversing properties.

Many cultivated areas around Farleigh are still moist, and excepting for the soil temperature, are quite fit for planting. The farmers here also cannot attach too much importance to the value of cultivation as long as it is possible to work in the cane. If a man has a larger area than he can conveniently work, it is better to relinquish some of it for a small farm well cultivated.

"Cane grubs are causing minor losses on the Farleigh farms, although no grower complained of serious loss. The destruction of feed trees—the fig, &c.—is to be recommended as incidental to checking infestation by these pests.

"Cane varieties making a satisfactory showing here are H.Q.426 (Clark's Seedling), Q.813, Badila, Q.1121, M.1900 Sport, and D.1135.

"Several watercourses are running strongly in the Farleigh district, and farmers on the banks of them could irrigate in the majority of cases without heavy expense.

"Owing to the long spell of dry weather, fertilising has generally been considered unprofitable for the recently planted cane. Therefore the percentage of farmers using concentrated manures has been small. Mixed and meatworks fertilisers have been used, but as far as can be observed the results so far are negative. Pulverised limestone has also been tried.

"As mentioned many times previously, green manuring is an important phase of sugar-cane agriculture, and is to be highly recommended wherever the land appears to want texture.

"*Sarina.*—The cane on Plane Creek is probably greener than on any other area in the Mackay district, but the cane itself, in common with other places, is short. However, if good rain fell now, such varieties as 1900 Seedling, which matures about October, would make great growth and probably pull the crushing up considerably.

"Many of the farmers are hard at work planting. That cane which has been planted during the autumn looks well.

"The cane-grub is causing serious loss in places. Continuous and deep cultivation will do much to check the grub attack on the cane roots, as well as ploughing in as much trash and vegetable matter as possible. Composts should be made of the trash with animal manure when possible, and then worked into the soil. Burning of cane should be consistently discouraged, and growers are recommended to plant cane varieties that do not require burning.

"Varieties doing well on the Sarina areas are H.146, Q.1121, H.Q.285, D.1457, Q.813, 1900 Seedling, D.1135, Hybrid No. 1, Q.458, N.G.15, "Pompey," Black Innis, Cheribon, and Clark's Seedling. None of these canes, however, are showing any particular resistance to grub attack, although Badila and D.1135 on an average are not showing signs of marked deterioration. Pompey is proving to be a good cane, with splendid ratooning qualities.

"Practically all the varieties mentioned are showing inclination to arrow.

"In common with other places, the growers have not gone in for much chemical fertilising, being content to wait until rain comes and the likelihood of a more positive result in this respect.

"*Marian.*—This portion of the Pioneer River sugar country is badly in need of rain, and the growers will have to considerably reduce their original estimate. The soil here is porous and well drained, and while it quickly responds to good weather conditions, gets very bad in drought. However, if rain fell at once, the cane would still increase in weight. The growers here are progressive, and probably do as much good farming as any other district in Queensland, and good results have been obtained in the past by cowpea manuring and the use of lime.

"Fertilisers used and giving positive results in normal seasons are sulphate of ammonia and meatworks manures. The soil is a light forest loam with an average acid reaction.

"Varieties showing the best growth at present are Clark's Seedling, 1900 Seedling, Malagache, and D.1135. Badila is a cane that is making a good response on some farms.

"*Pinnacle Plains and Owens Creek.*—These areas are probably the richest agricultural belts in the Mackay district. At present the cane is suffering from want of rain, and loss is being occasioned by grub-infestation in parts, but these factors are not likely to be a permanent drawback to the producing power of these farm lands.

"The railway has almost been completed up Owens Creek, and a considerable area of land hitherto unploughed is being broken up for planting, while there are still large areas suitable for sugar-growing awaiting the settler. The land adjoining Owens Creek is for the most part a deep-made soil, consisting of alluvial and granitic deposits with plenty of vegetable matter deposited from periodical overflows from the

creek. Varieties doing well here at present are M.1900, Badila, Green Goru, Q.813, H.Q.426, Cheribon, Q.458, and D.1135. Of these, M.1900 Seedling and Badila appear to be the best.

"The average reaction of the soil in these parts is acid, and the growers are recommended to obtain supplies of burnt lime and apply 25 cwt. per acre.

"Probably the only other matter necessary to successfully raising cane here is intensive cultivation. It is improbable that artificial manures will be required for some time, excepting, perhaps, on the forest land lying back from the creek. This would be benefited also by crops of green manure.

"The cane right up Cattle Creek to the mill looks dry but healthy, excepting where grubs have made an occasional attack. If rain fell at once there would still be a big tonnage added in the next few months.

"*Homebush.*—The farmers here are busy planting at present, and the management has just completed its plant for transhipping the coming crop to Farleigh. This has involved a considerable amount of labour and money, but the work under Mr. Axam, the Homebush manager, has been carried out with efficiency and despatch.

"As with other districts, Homebush shows the want of rain. Most of the cane is very healthy, however, and there are no complaints by the farmers of any disease of a serious nature or grub infestation.

"The most popular variety growing at present is Malagache. Other varieties being raised successfully are Pompey, Q.1098, M.1900, D.1135, H.Q.426, and Q.813. Pompey is proving to be a good cane, and numbers of farmers are now raising this variety. Q.813 is a variety that is doing well and which the growers should endeavour to get more of.

"The soil here has an average acid reaction, and requires lime more than anything else.

"The farmers should note that it is a bad plan to use a plough in plant cane after it has begun to root."

THE SUGAR-GROWING DISTRICTS OF NORTH QUEENSLAND.

By H. T. EASTERBY, General Superintendent of Sugar Experiment Stations.

The General Superintendent of the Bureau of Sugar Experiment Stations, who has been absent from Brisbane during the past seven weeks (1st July, 1922), states that during that time he visited the sugar districts of Bundaberg, Mackay, Lower Burdekin, Mossman, Cairns, Babinda, and Innisfail.

At Bundaberg it was found that the prolonged dry weather had adversely affected the yield, and the large crop it was anticipated would be harvested has now shrunk a good deal. The standover cane has suffered considerably, and although last year's plantings received an excellent start, the lack of rain during the past three or four months has prevented the cane making the growth it should have done. A large quantity of cane is presenting a withered, and in some cases a dying, appearance. This is exceedingly disappointing, as some few months ago everything pointed to a bumper crop in this and the Isis district, which has also in common with all the southern districts suffered greatly from the prolonged dry spell. A fair amount of planting for next season has been done.

The climatic conditions at Mackay, while not quite so severe as at Bundaberg, have also held the crop back, and the mills have all been obliged to reduce their estimates and postpone their crushings till a later date. It is most unfortunate that the usual wet season this year did not put in an appearance, as the rainfall previous to the end of last year was good and sent the cane crops well ahead. A good deal of new land is being opened up about Mackay. In addition to the fine cane areas at Carmilla, about 1,000 acres of first-class forest and scrub land have been sold at the Pinnacle, on the Hatton line; also new areas near to Carmilla, on the Mackay-Rockhampton line, are being opened up for canegrowing.

Exceedingly dry weather has also been experienced on the Lower Burdekin district, and many areas not irrigated were found to be dying or dead. The irrigated cane, however, looked well-grown, green, and healthy. The cane on the State farm, Home Hill, had made excellent growth, and should cut out well. The Tableland Badila was conspicuous by its fine appearance. The mills on the lower Burdekin, while not realising earlier anticipations, will have a fair crushing. Grubs were found to be doing some damage in places, and as this district has never been affected to any extent, this is giving rise to a good deal of anxiety. Fortunately, so far, they

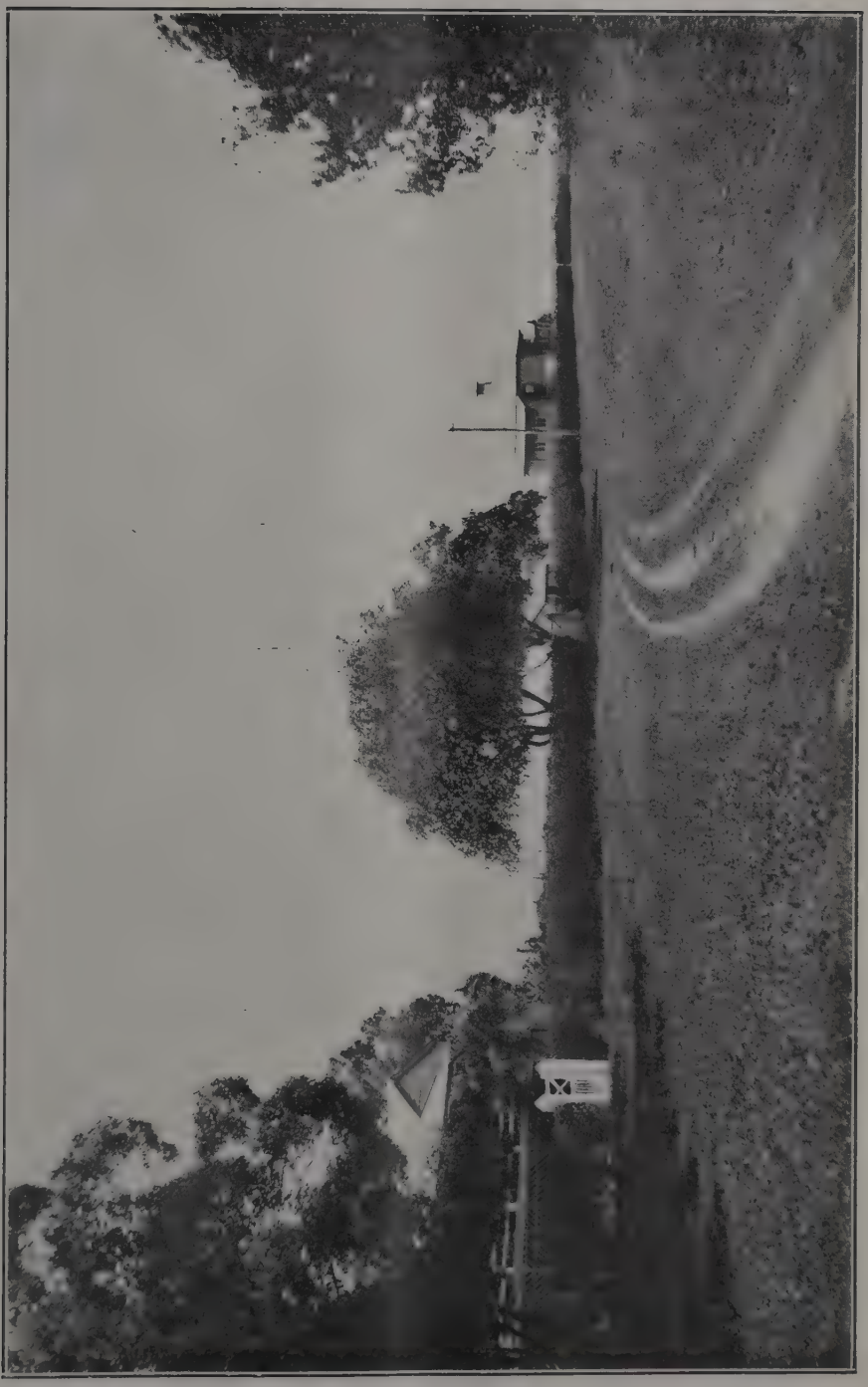

Plate 9.—Sugar Experiment Station, Mackay, N.Q.

are confined to the one area. The formation of a Beetle Board and fumigation of the soil by means of carbon bisulphide were recommended.

The Home Hill irrigation scheme is now well advanced, and water is being supplied to some farmers. It is hoped that in a very short time all the farmers in the scheme will be enabled to irrigate their cane.

The Goru and Badila varieties are still holding their own in the Lower Burdekin district. A very fine crop of "Ginger" was inspected upon the farm of Mr. Crofton, at Ayr. This is a cross between Mauritius Gingham and Striped Goru, raised by this gentleman, and it is doing exceptionally well, and is a good density cane. This cane is also doing remarkably well at the experiment station at Mackay.

The cane crop was found to be good at the Mossman district, where it is expected that about 70,000 tons of cane will be crushed. There is very little grub pest visible, and the cultivation and manuring have been good. Large quantities of fertilisers are purchased by the Mossman Mill for the use of farmers, and these are showing good results.

At Cairns good crops were also seen, but a good deal of this cane in the vicinity of Cairns, Hambledon, and Mulgrave was badly affected by grubs. It is very questionable whether it was a wise thing to abandon the collection of grubs and beetles, as was done some time ago. The matter is now under reconsideration, and it is probable that the collection, as a check measure, will again be proceeded with. The present appearance of the estate at Greenhills, near Cairns, is deplorable, and the acres of dead and abandoned cane and trash must afford a breeding place for the grub. Experiments with arsenic and carbon bisulphide have been carried out here on limited areas with a good deal of success where large applications have been used. The principal feature in the Cairns district has been the enlargement of the two mills of Mulgrave and Hambledon, this being equal to another large mill in the district, and has enabled the fine Freshwater district to go ahead. This beautiful area is now covered with magnificent crops of the Badila variety, and presents a beautiful and attractive appearance. A fine powerful crushing plant has been installed at Mulgrave to take the place of the old mills. The new plant consists of three new crushing mills 72 by 35, with three 26 by 48 cylinder engines, all made by the Maryborough Foundry. In addition there are new juice-heaters and a new set of quadruple effects, bringing the heating surface up to 18,000 feet. The first and second mills have been set with 60-feet centres, while between the second and third mills there are 45 feet, thus providing for plenty of maceration. There are also four high-pressure 120-lb. multitubular boilers, in addition to four 70-lb. boilers to be used for the evaporating plant. The capacity of the mill will be 45 tons per hour, the speed of the carrier 3.2 feet per minute, the maximum roller speed being 16 feet per minute. The maceration water will be passed through a juice-heater so as to be very hot upon application. New centrifugals have also been installed. All the machinery, except the crushing plant, will be electrically driven. All this means that the Mulgrave is practically a new mill of at least 150,000 tons capacity, and it is little short of marvellous that the old machinery has been taken out and this new magnificent plant installed between the end of last crushing and the beginning of the present one. The new machinery was built by the Maryborough and Bundaberg foundries, and everything was supplied in first-class condition and to time. The directors are to be highly congratulated, as well as the manager (Mr. Howe) and the engineer (Mr. Smith), who have worked continuously on the job, aided by their staff, and the whole of the installation work reflects the greatest credit on them. Outside the mill 9½ miles of new tramline have been built of 40-lb. rails on the south side of the Mulgrave to open up the Aloomba lands, the cane from which now goes to Mulgrave.

Great improvements have also taken place at the Colonial Sugar Refinery Company's mill at Hambledon, which will also be now capable of dealing with 150,000 tons. A new mill has been installed, bringing the total to four, and much other machinery. The new area of Freshwater has been added to this mill, and the management expect to draw 50,000 tons of cane from that area this year. The enlargement of these two mills is an excellent thing for Cairns, and has meant the opening up of new tracts of fertile cane lands.

The Babinda areas are presenting a good appearance, though some of the late-cut ratoons are backward again this year. The grub pest is not much in evidence in the southern parts of the cane areas. The mill made a fine start on the 14th May, the cane being then of excellent sugar-content. Dry weather had been experienced for about four weeks prior to this, which had greatly assisted farmers. The total rainfall from 1st January to 31st May this year had been 144 inches, as against 186 inches for the same period last year. The mill has received a first-rate overhaul this season, and is confidently expected by the management to do the best of work.

There are very few foreign farmers at Babinda, the total only amounting to 7 per cent. There are, however, a large number of non-British cutters operating this season.

The Innisfail district is not greatly affected by grubs this year. There are practically none about Goondi, but they are more prevalent at South Johnstone. The cane generally is looking well, and farmers are looking forward to a good harvest. For the first five months of the year some 80 inches of rain fell. A dry spell of about four weeks took place from the middle of May to the middle of June, when rain again commenced. It is hoped, however, that the remainder of the season will be comparatively dry, so as to ripen up the cane and assist farmers to get their crops off and in their cultivation.

The annual field days at Bundaberg and Mackay were held during Mr. Easterby's tour, and were eminently successful. Record attendances of farmers were secured, and these displayed an absorbing interest in the station work with cultivation and varieties. Both stations looked particularly well, and great credit is due to the officers in charge (Messrs. Pringle and Keogh).

The experiment station at South Johnstone was presenting a fine appearance, and good crops are anticipated. About 200 seedlings were raised last year, and these are now planted out in the field and making excellent progress. The officer in charge (Mr. McWalters) has carried out his duties in a most satisfactory manner.

Addresses were delivered in nine centres, at which the schemes for the establishment of district councils and producers' associations in connection with the Council of Agriculture were brought under the attention of farmers and discussed. The proposals were well received.

The plantings for next year have so far been good in most districts.

To sum up, it may be said that the crops above Townsville will be very good, while south of that they will be well under the average. It is expected, however, that the crop will reach the amount required by the consumers of Australia. A revised estimate will be issued by the Bureau in a few days.

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Entomologist at Meringa, near Cairns, Mr. E. H. Jarvis, dated 11th July, 1922:—

"GRUB-FUMIGATION AT GREENHILLS.

"The experiments with carbon bisulphide carried out by the C.S.R. Company at Greenhills last February have yielded data which should prove serviceable when dealing with the beetle pest next season.

"The cane on Block J6, which was fumigated towards the end of February, after showing evidence of grub attack, appeared at first likely to recover (see March report), but did not ultimately regain sufficient hold of the ground to withstand subsequent dry conditions experienced from 17th March to 15th April, which, being accompanied by strong winds during the latter month, caused the cane in both treated and control plots to fall over. This experiment shows us the advisability of fumigating early in the season, at a time when grubs are not large enough to materially injure the main roots, and the soil is usually in drier and better condition for such treatment than is the case later on during the wet season.

"A capital instance of benefit to be derived from early treatment may be seen at Greenhills just now (20th June), on Block J6, where the manager, Mr. Hoelscher, fumigated a quarter-acre plot before the cane had become affected by grubs.

"This plot of Badilla received half an ounce of carbon bisulphide to each stool (quarter ounce on each side), while the adjoining plot was not fumigated. Although the cultivation, manuring, and character of soil was the same in both cases, the cane on check plot is noticeably shorter than that on the treated area, this being due to the presence of grubs, which by constantly severing the main surface feeding-roots mave materially checked growth of the stools.

"As reported last April, it is possible to successfully fumigate, not only the grubs, but both pupæ and eggs of our grey-back cane-beetle.

"A newly-hatched grub, however, breathes by means of spiracles, of which there are nine on each side of its body, opening directly into trachæ that subdivide again into small and still smaller air-tubes. During this life-cycle stage it is, of course, very susceptible to fumigation, even while in its first instar, and too small to do serious damage to cane roots.

"Then, again, the spiracles of the pupa or chrysalis, which are even larger than those of the grub, afford ready admittance to gaseous fumes.

"In normal seasons bisulphide fumigation should be commenced about the middle of January; not, however, until termination of the egg-laying period, when the ground is usually in good condition for such treatment. Later on, after the rainy season has set in, excessive moisture interferes with the soil porosity, and moreover, grubs being then in the third stage, have started to seriously injure the root system.

D. 1135 AT HIGHLEIGH.

"Learning from Mr. Wilson Irvine that D. 1135 was doing well in the above locality, and, as a result of careful cultivation, had shown a marked tendency to produce abnormally stout canes, a visit was made to Highleigh on the 13th instant, when Mr. J. Cannon drew my attention to certain stools of this variety, planted by him during August and September, which were bearing exceptionally fine canes.

"The block planted in August was manured, but had no lime, while the September planting was treated with 35 cwt. of lime per acre.

"Seeing that D.1135 appears to thrive well in the Cairns district, and is more resistant than Badila to root-eating grubs and to the weevil-borer, growers should not fail to embrace any chance of obtaining an improved strain of this variety. This can be done very simply, by selecting only the stoutest canes from a number of stools for seed purposes. These should be planted together on a small area (one-eighth of an acre, or even less), the sets being cleanly cut in order to minimise risk of invasion from fungi, and at the same time examined for evidence of redrot or weevil-borer, &c. If growers would take the trouble to plant a patch in this way, most of the resultant stools would be found to consist of stout canes, some of which would tend to be finer than any of the selected seed. By again using for plants the canes derived from a plot of this kind, a few acres of an improved strain, of uniform quality throughout the plantation, could be obtained in the shortest possible time. Such artificial selection is within the reach of every intelligent farmer; and since Nature's law, that like produces like is indisputable, any time so expended could not fail to yield a substantial return from a monetary standpoint.

"It should, however, be borne in mind that when growing a patch for seed in this manner the land chosen for the purpose should, if possible, be of uniform character, and receive similar treatment as regards manuring and subsequent cultivation.

"CAIRNS SHOW EXHIBITS.

"Some time was occupied this month in the preparation of entomological specimens and other exhibits for staging at the annual meeting of the Cairns Agricultural, Pastoral, and Mining Association.

"This took the form of coloured diagrams and charts illustrating, for the most part, the underground working and life-cycle stages of our principal cane-beetle, and the effect produced by same upon the growing crops during each month of the year; a small general collection of insects, including the eggs, grubs, and pupæ of the root-eating scarabaeidæ affecting cane; and other exhibits of a scientific nature dealing with the chief parasitic and predaceous enemies of our cane-beetles and their larvæ. The exhibition was well attended, and many growers availed themselves of our invitation to freely discuss the question of grub and beetle control, with the result that much interesting exchange of opinion took place regarding several complex phases of the all-absorbing cane-grub problem.

"EARLY HISTORY AND ORIGIN OF THE GRUB PEST.

"Damage to cane from the attacks of cockchafers is recorded as having occurred first at Mackay, as far back as 1872; and twenty-three years later (1895) when the trouble had assumed a serious aspect, Mr. Tryon was asked to investigate the matter and recommend measures for controlling the pest. About that time grubs were beginning to make their presence felt around Cairns, and we find Mr. S. W. Davids, the late manager of Mulgrave Central Mill, in his annual report for 1897, calling attention to the appearance of grubs and cane-beetles in various spots in the neighbourhood of Gordonvale, and suggesting that steps be at once taken to check the evil. His advice was acted upon, but, as is usual in such cases, the matter was not regarded seriously by the growers, and accordingly the following year Mr. Davids reported as follows:—'The ravages of the grubs are very evident, and unless steps are taken at every opportunity to destroy the grubs and beetles when met with, we may look for the same disastrous results, as experienced in other sugar districts.'

"The above correspondence is doubly interesting from the fact that, in addition to throwing considerable light on what may be termed the prelude to an invasion that a few years later assumed colossal proportions, it also enables us to determine the source from which most of the present trouble originated.

"Data obtained by the writer in 1915 goes to show that infestation of the cane lands around Gordonvale was in the first instance brought about by beetles that did not originate in that locality, but were transported there from extensive breeding-grounds situated either in the vicinity of Aloomba or several miles eastward of that district. This view of the case is not merely theoretical, but may be taken as an established fact, verified by the experience of leading growers, many of whom have had unique opportunities of observing the gradual encroachment of this pest during the past twenty to twenty-five years. Mr. R. E. Riley, late Chief Cane Inspector at Mulgrave, who during his long residence at Gordonvale made many interesting observations in this connection, appears to have been the first to notice in the early days (1897) that our grey-back cockchafer bred habitually in enormous numbers around Aloomba over extensive areas supporting the so-called 'blady-grass' (*Imperata arundilacea*), which constitutes one of the commonest native food-plants of this beetle. Subsequent observations by the writer have shown also that its grubs subsist very freely on roots of other cereals, notably the 'carpet-grass' (*Paspalum platycaule*) that commonly covers recently cleared scrub lands.

"When cane was first planted at Gordonvale no serious injury followed until some years later, from which we may infer that when beetles are collected in any given locality others do not, as some growers imagine, immediately take their place, but reinfection from the outside bush is a matter of time—perhaps of some years.

"Any beetles chancing to invade such cleaned-up localities the following season may, therefore, be presumed to come from adjoining cultivated areas that had not been collected over; so that benefit would result, as a matter of course, although not always to the deserving parties.

"If, however, a general systematic collection could be made throughout our district and kept up for a few years, destruction of the vast host which have gradually entrenched themselves and are breeding within the tract of country devoted to the cultivation of sugar-cane could hardly fail to afford a measure of relief.

"The foregoing evidence seems to me to be supported by experience in the past at Mackay, and, I believe, other sugar centres, where it has been noticed that when collecting has been given up—owing to a scarcity of beetles—a few years have generally elapsed before a fresh invasion of the pest has again called for action."

THE 1922 SUGAR ESTIMATE.

The General Superintendent of the Bureau of Sugar Experiment Stations states that, owing to the very dry weather experienced in the districts below Townsville during the usual wet seasonal period, it has been necessary to reduce the previous estimate of the Queensland sugar crop from 290,000 tons to 283,000 tons. This is only a rough estimate, as a warm moist winter may increase the yield as a dry frosty period would reduce it. This tonnage, however, if realised, will suffice for Australia's requirements, and with the production of New South Wales may leave a small carry-over. The production in 1921 for Queensland was 281,000 tons, and a good proportion of this was made up during the latter part of the season, which was very favourable, the earlier estimates being considerably less.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 13.

THE CROW'S APPLE.

The Crow's Apple (*Owenia venosa*) is common in the drier scrubs of the coastal area of Queensland, from the border of New South Wales to Rockhampton, Queensland, in such places as Boonah, Rosewood, Benarkin, Nanango, Many Peaks, and as far west as Eidsvold. It is confined to Queensland. The trees attain a height of about 70 feet, and a barrel diameter of about 1 foot 6 inches. The barrel is not conspicuously flanged at the base. The bark is grey with patches of brown, very scaly, shed in square and oblong pieces, and when cut is purplish-brown, but paler towards the sapwood, measuring ½ inch thick on a tree with a barrel diameter of 1 foot 3 inches. When grown in the open the trees form a shapely round head of dense foliage. The fruits are red, globular, 1 to 1¼ inches in diameter; the outer fleshy part surrounds a hard inner part, which contains from two to four cells, each cell containing a single seed.

Photo. by the Authors.] PLATE 10.—THE CROW'S APPLE (*Owenia venosa*).
A specimen in the Imbil Scrubs.

Plate 11.—The Crow's Apple, Flowering Twig.
A.—Dried fruit. B.—Section of fruit.

A CHILLAGOE ORCHARD.

BY ERNEST B. FREEMAN.

Just 2 miles out of Chillagoe, and half a mile from the north side of the railway line, going to Mungana, is one of the heads of Metal Creek, and on it is situated the home of Mr. and Mrs. T. Vautin. The land, a piece of heavily-timbered forest, was taken up a little over ten years ago, and all the spare time and spare money during that time has been put into it.

In preparing the land for fruit-trees, Mr. Vautin used dynamite to blow up the subsoil, thus giving the tap-root a chance to go downwards, and enabling the tree to bear fruit upwards. The benefit of this procedure is visible to-day. A well was sunk and timbered, good water being struck at between 20 and 30 feet. A 1,000-gallon

PLATE 12.—PAW-PAW TREE GROWING ON MR. T. VAUTIN'S ORCHARD, METAL CREEK, CHILLAGOE.

tank was elevated on blocks several feet high. A lift and force pump were installed, the first power being supplied by a weighted cart wheel which was used up to eighteen months ago, when a windmill was erected which supplies the power to-day. Except for the building of the cottage, Mr. Vautin himself has split the posts and erected the fences, and the goat and fowl house and yards. About sixty fowls and the same number of goats are kept on the place, as well as one horse. Even the windmill he put together himself, only getting assistance in its elevation. During all this time he has been ably assisted by Mrs. Vautin, who is a first-class housewife and maker of jams and preserves. When the Chillagoe Company closed down, Mr. Vautin went to Babinda, being away about two years, and Mrs. Vautin bravely bore

with the loneliness (they have only one child—a fine boy), and kept the home fires burning in the truest and best sense of the word. When Mr. Vautin returned to stay, he took up his home work where he had left it off, and he kept it going again. A few months ago he decided that he had enough planted to get a living with, and so commenced to hawk fruit and vegetables. One result of this is that he has had to secure assistance. To-day the orchard and garden show what a man and woman can accomplish when they are both agreed on the one objective.

The land tenure was miners' homestead lease, which has been raised to miners' homestead perpetual lease. The State Government is the landlord, the rent is low, the landlord is merciful, and there is plenty more land there on the same tenure.

Mr. Vautin has accomplished the above without raising a mortgage or even borrowing from the Agricultural Bank, so it is all his own, and neither rent nor interest day has to him any terrors.

One great enemy here is the white ant, which bores up into the centre of the trees. They may, however, be overcome by attention and cultivation.

A reliable supply of good water can be obtained anywhere by sinking from 20 to 40 feet. The climate is very equable, and the locality is free from frost.

THE SCRUB AND FOREST LANDS OF QUEENSLAND.

By Major A. J. BOYD, F.R.G.S.

About sixty years ago, when I was working a scrub farm only a few miles from Brisbane, which had a frontage to a fairly large creek (the Oxley, a tributary of the Brisbane River), several enterprising Southern farmers as well as new arrivals from Great Britain purchased land—some on the Darling Downs plains and others near the eastern cities, in order to be near a market for their produce, thus avoiding long land-carriage in the days of no railways and bad roads. Those who settled on the scrub lands near the coast had the advantage of water-carriage by tidal rivers and creeks.

One of the Victorian arrivals was a well-to-do farmer who was making his home on a large scrub farm. In the course of conversation he said: "Wheat-growing I have been brought up to, and I know how to manage on the Western country; but here, on this scrub land, is where I am 'at sea.' Here is where I want instruction in clearing this jungle, and in planting seasons and methods." It is, then, with a view to assisting the newcomer of to-day to start properly, and to manage a scrub farm properly, that I give the following hints, which are the result of many years' experience gained in the early days of rough farming in Queensland.

There is nothing new to-day as regards getting rid of the thousands of trees constituting what may well be called a jungle. There is no royal road to making the land bear a crop. It must be handled to-day as it was handled by us—the first settlers. It was felled with the axe, and the work demands some dexterity in the use of this invaluable tool.

Most of the riverside scrubs contain many valuable timber trees, such as red cedar and pine of three kinds (Bunya, Kauri, and Moreton Bay or hoop pine), but very little cedar is now to be found in districts where it formerly abounded; other timbers are yellow-wood, beech, and hickory. Thousands of feet of such timber have been burnt off in the early days of scrub farming. Obviously it would be unwise to destroy the valuable timbers mentioned, for which there is always a market. To fell scrub properly it is well, if possible, to select a time when the sap is down, and this occurs about the winter months, when the timber will dry quicker, and consequently burn off easier and more thoroughly than if felled when the trees are full of sap, although even this difficulty may be got over by judicious felling.

It is a common thing for scrub-fallers to cut half through a number of small trees and then to drop a large tree on top of them; when the large tree falls it naturally brings down all the smaller ones with it. But now mark the result. The small trees which were only half cut through are mostly not detached from the stumps. A strip of bark and timber on the uncut side still forms a connection with the roots, and consequently the sap continues to flow, and the tree, although felled, remains green, and, of course, will not burn well for months, and probably not at all until it has been handled a second time. "The longest way round is the shortest

way home'' is an old and a very good adage, and it applies to this case. By the method mentioned the trees will no doubt be quicker felled, but when we come to the clearing of them off the ground, then it is that we find out the mistake. But it is then too late; the mischief is done, and we can only make the best of it. This has been my own experience, and I have since cleared many acres of scrub, both on the coast and inland. [The practice nowadays is to nick the smaller trees with a belly and back cut, and this method ensures the bringing down of the saplings and small trees clear of the stump when the ''driver'' is felled.—ED.] To fell scrub properly and obtain a good burn, the first thing to do with a standing scrub is to ''scrub'' or ''brush'' it—that is, to go through it with axe or a ''bill'' with a long handle, and cut down all the small trees, saplings, and shrubs under 6 inches in diameter, taking care to lay them flat by lopping any branches sticking up, and at the same time (in a vine scrub) all the vines, lawyer-canes, and other creeping and climbing vegetation must be cut to the ground and cleared as high as possible from around the larger trees. Neglect of this vine-clearing may lead to serious accidents when it comes to felling the timber.

Assuming this to be thoroughly done, we may proceed to deal with the larger timber and drop it upon the already partly dried small stuff. Every tree, as it is felled, should be lopped as to its branches, and the whole laid as flat as possible.

In proceeding in this manner we are simply carrying out on a large scale the building of a small fire. The small stuff lies below, the larger limbs above, and the heavy trunks above all.

Should the scrub contain many bottle trees or stinging trees, some trouble arises, as these are very large and pulpy, and contain such an enormous mass of moisture that they will not readily burn. My plan was to split up the nettle trees and allow the bottle trees to rot on the ground. The latter were very large and numerous on my scrub farm, ''Forest Hill,'' near Laidley, and gave little trouble, as they were easily felled and rotted rapidly. While the felled trees are drying the farmer has time to attend to preparing fencing stuff to be erected after the burn-off. The fence should not be erected until after the fire, say, about six or eight weeks after the last of the timber has been felled, according to the state of the weather. The best time to burn is at night if there is a nice breeze blowing. [The practice to-day in most scrub districts is to choose a hot, dry day, with the wind blowing from a suitable direction.—ED.] I should have mentioned that the ''burn-off'' must not be deferred until the leaves have all dropped off the limbs. Should this have happened, a bad burn is almost sure to be the result.

Fire should be applied at several points at once, for it is a well-known fact that a large fire always creates a draught, and this materially helps to a good burn-off. If the timber has been well lopped, has lain a sufficiently long time, and a suitable day chosen for firing, it will be found that a clean sweep has been made of all the fallen timber, a few of the largest logs alone being left. These, however, will present no serious obstacle to subsequent planting operations, and will be easily got rid of later on.

In the case of a brigalow scrub, after a good burn scarcely any logs remain unburnt.

If the burn has taken place between August and December, corn-planting may be at once proceeded with. There will be no weeds to chip—the land presents to the view only a vast area of charred stumps and scorched ground, relieved by numerous patches of white ashes, still further enriching the fertile scrub soil. It is well to scatter the ash-heaps to utilise them to the best advantage.

Although the soil is apparently a mass of roots, these are generally soft and are easily cut through by a No. 3 breaking-up hoe.

Two crops may now be sown—viz., maize, and at intervals of from 20 to 30 feet; pumpkins may be sown on the same land without detriment to the corn crops. Rhodes grass may also be broadcasted along the rows, thus ensuring, in favourable seasons, a grassed paddock by the time the corn is ready to pull.

STUMPING.

Now, as to stumping the land to fit it for the plough:—It takes about three years for the general mass of medium-sized stumps to rot. The smaller ones will have disappeared in about two years, owing to constant cultivation of the soil and consequent destruction of the roots.

Various plans have been adopted at different times to bring the land under the plough. Some farmers used to break up the whole of the land intended for crops, taking the stumps out on a face. Others merely took out the stumps without breaking up the land, and, when stumps and roots were burnt, broke the ground up with a

strong bullock-plough—a work easily performed, as the tangled masses of roots are completely rotted by the end of three years. Once the plough can be set to work, the cultivation of the land differs very little from that adopted on plain lands. As already stated, the first crop generally sown on new scrub lands is maize. This is done easily with a breaking-up hoe or hand-planter, the soil being a rich alluvial, consisting mainly of the rotted accumulation of fallen leaves, trees, &c. The planter marks out a straight line through the maize of stumps by putting in stakes, with a piece of white paper or rag on the top, at intervals of 40 or 50 yards from the starting point. Then, by raising his hoe, as he advances in a line with the sticks, he manages to keep a fairly straight line. In later days an American hand-planter has completely superseded the old-fashioned hoe for maize-planting in scrub lands.

The seed was carried in a canvas bag, with a wide mouth, slung round the waist. One blow of the hoe is sufficient to make the necessary hole, into which from three to five seeds are dropped according to the soundness of the grain. A backward pushing of the seed and the planter then advances far enough to plant one foot on the last hole planted. The pressure will not harden the surface soil on the virgin scrub land; on the contrary, it just gives the pressure required to settle the soil over the seed. This regular advance brings him to the proper distance at which to make the next hole. The proper number of seeds is dropped, and so the process goes on till the whole field is planted. At intervals, as above mentioned, of, say, 20 or 30 feet, pumpkin seeds are dropped between the maize.

Now, a word or two about seed corn, which is a very important matter not to be neglected:—It has always been the custom with corngrowers to select the largest flat grains for seed. There can be no doubt that if the round seeds are sown the crop will turn out a poor one. I have made experiments with these round grains taken from the upper portion of the cob, and invariably the cobs have not filled properly. But there is one point in connection with seed corn which is perhaps not generally known, and that is that the largest grains do not always necessarily produce a large plant. The size of the embryo plant within the seed bears no relation to the size of the grain; of course, it can well be understood that the larger the seed the more food material there is to enable the plant to resist adverse influences and to enable the embryo to push its way up from a depth which would be fatal to a weaker germ. In this opinion I am borne out by the Agricultural Research Association of Aberdeen. So far back as 1896 the work done by that association was concerned chiefly with the cultivation of oats and the grass crops. With regard to the "dressing" or selection of oats for seed, the report said: "It has been proved by experiment that, contrary to what might have been anticipated, large seeds afford no ground for expectation of the production of large ultimate plants or heavier crops, nor do they secure any earlier germination. What they do secure is power to reach the surface, though deeply deposited, and a stronger beard, which will enable the plants to withstand uncongenial conditions of soil of season at the early stage of growth.

"The subject was followed up, and it was found by investigation that the size and strength of the embryo plant within the seed does not bear any relation to the size of the seed. Small seeds may often contain larger or stronger embryos than a large seed." To continue my subject:—When the farmer has cleared his land and sown the seed, nothing remains to be done for the next four or five months in connection with the first corn crop, as there is little growth of weeds on the newly burnt-off soil, and no cultivation is required unless potatoes have been planted, as these will require to be hilled up.

In a favourable season, on such soil as I have described, the maize grows with extraordinary rapidity, and will throw up suckers here and there which should be removed. This labour is not great and the suckers provide good fodder for cattle, horses, and pigs. Just before the stalk begins to turn yellow the flowering tops may be cut off just above the grain cob. This will not injure the crop, as the pollen from the flower head has long ago performed its duty by fecundating the tassel of the cob, which now requires no more nourishment from it.

Corn should be pulled on dry days and not until the grain has set hard enough to resist the pressure of the thumb nail. This test also applies to the pumpkin, whose ripeness may further be ascertained by noticing that the curl at the stalk is withered. When the cobs are safely in the barn, husking should be done quickly, and the cobs should remain for some days to dry, as the drier it is the better it will thresh.

The forest lands suitable for agricultural settlement will form the subject of a future paper.

A NATIVE FODDER TREE FROM NORTH QUEENSLAND.*

BY C. T. WHITE, F.L.S., Government Botanist.

Some years ago the late F. M. Bailey recorded a species of *Sideroxylon* for North Queensland as *S. arnhemicum* (a Northern Territory species), and at the same time quoted Mr. G. Jacobson to the effect that the tree was a valuable fodder species, stock being exceedingly fond of the leaves. I recently collected specimens of this tree in the Gilbert River district, and, in looking through our herbarium specimens, found we had the same species from several Northern localities under *S. arnhemicum* and *S. Pholmannianum*. After examination of a large series of specimens, I have come to the conclusion that it is only a hairy form of the latter. I had at first thought it represented a new species intermediate between *S. arnhemicum* and *S. Pohlmannianum*, and had drawn up a full description of it. It was included by Mueller in his original comprehensive description of *Sideroxylon Pohlmannianum* (under *Achras* in Fragm. Phytogr. Austr. v. 184), but I certainly think it should at least be given distinct varietal rank and propose to name it as a new variety.

S. POHLMANNIANUM var. VESTITUM n. var. *varietas nova foliis utrinque dense pubescentibus.*

Description.—A tree 25–30 feet high with a dense spreading head, branchlets rather stout, prominently marked with the scars of old inflorescences, younger parts densely ferruginous-pubescent. Leaves softly and densely pubescent on both faces, lanceolate or elliptic, petiolate, petiole ½–1 inch (.7–1.5 cm.) long, 1½–2 inches (4–5 cm.) broad. Flowers in dense clusters at the old nodes below the leaves, pedicles 1½ lines (3 mm.) long, softly pubescent. Calyx-segments 5, densely pubescent outside, very much imbricate, orbicular, about 1 line (2 mm.) in diameter. Corolla lobes 5, truncate, slightly longer than the calyx. Ovary surrounded by a dense ring of long hairs, 5-celled. Fruit more or less globular about ¾-inch (2 cm.) in diameter. Seeds compressed, 6-7 lines (1.3—1.5 cm.) long, 4 lines (9 mm.) across, dark brown, hard and glossy, hilum or scar nearly the length of the seed. *S. arnhemicum*, Bail. Bot. Bull. v., Depart. Agric., Brisbane, p. 19 (1892); Queensland Flora, pt. iii., p. 956 (1900), not *Achras arnhemica* F. v. M.

Habitat.—Gilbert River, *C. T. White* (type); Musgrave (Cape York Peninsula), *Geo. Jacobson;* Endeavour River, *W. A. Persieh;* Ollera Creek, near Townsville, *W. Young;* Walsh River, *T. Barclay Millar.* So far as known, confined to North Queensland.

Properties.—The late F. M. Bailey (l.c.) quoted Geo. Jacobson to the effect that cattle and horses are very fond of the foliage, and that in times of scarcity of feed the tree is cut down for fodder. W. Young, in sending specimens for identification from Ollera Creek, North Queensland, stated that stock were very fond of the leaves. Mr. F. Turner (Proc. Linn. Soc. N.S. Wales., vol. 41, p. 101), quotes Mr. A. H. Cooper to the effect that *S. arnhemicum* is a valuable fodder tree in North Queensland; most likely the tree now described is referred to.

Botany.—The normal form is common in many parts of the State, but we have no record of its being used as fodder. I have no doubt, however, it will be found equally useful when tried, as will also most likely the true *S. arnhemicum* from the Northern Territory. The three trees are very much alike in character, the chief distinctions being—

Leaves pubescent on both sides.

Leaf blade broadly elliptic, 3–3½ inches (7.5–9 cm.) long, 2–2½ inches (5–6.3 cm.) broad, tapering into a petiole of 1–1½ inches (2.5–3.7 cm.) flowers 6–merous (?). *S. arnhemicum.*

Leaf-blade lanceolate or narrow elliptic, blade 3½–6 inches (9–15.5 cm.) long, 1½–2 inches (4–5 cm.) broad, petiole ½–1 inch (.7–1.5 cm.), flowers 5–merous. *S. Pohlmannianum* var. *densevestitum.*

Leaves, with exception of the midrib and main lateral nerves, green and glabrous on both sides. *S. Pohlmannianum* (type).

Acknowledgment.—I am indebted to Mr. W. Laidlaw, B.Sc., Government Botanist, Melbourne, for loan of type material of *S. arnhemicum* from the National Herbarium for purposes of comparison.

* As this article describes a new variety, and is of some botanical interest, it is unavoidably somewhat technical. A brief Latin diagnosis of the variety is given in accordance with the International Rules of Botanical Nomenclature.

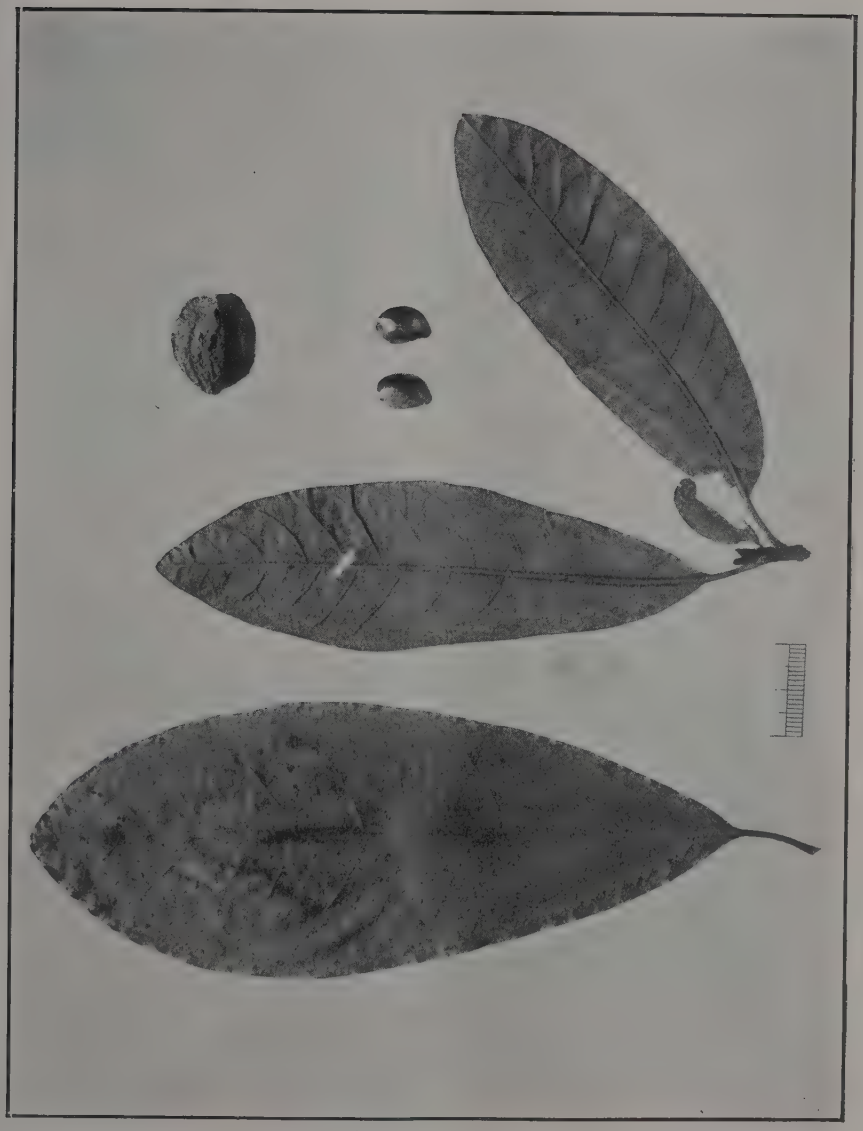

Plate 13.—A Native Fodder Tree (*Siderozylon Pohlmannianum* var. *vestitum*).

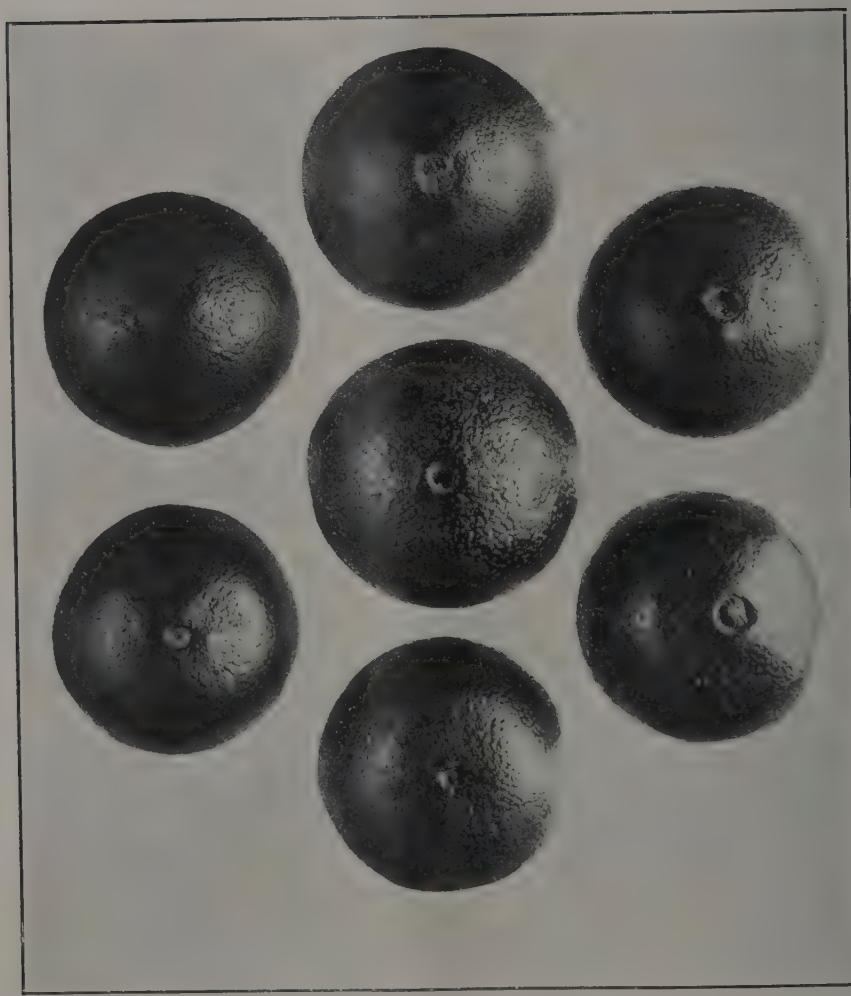

PLATE 14.—NAVEL ORANGES GROWN BY MR. C. ROBINS, MIRIAM VALE, ALPHA, CENTRAL WEST.

ELECTRIC MECHANICAL COTTON-PICKER.

C. D. Wagoner, writing to the "Farm and Live Stock Record" (United States, America), gives a most favourable report by Mr. L. C. Stukenborg, a resident of Covington, Kentucky, United States, America, on the latest invented machine for cotton-picking, for the manufacture of which a strong company has been formed under the name of the Cotton-Picker Company of America. The original machine was put to the first test in 1917, and since that time many valuable improvements have been added to the invention. The company has prepared and issued an exhaustive pamphlet dealing with the five great factors of the cotton crop and how to correct them. These factors are cultivation, harvesting, ginning, spinning, and weaving.

For the present we need only consider the matter of harvesting. We know that many devices relative to cotton-picking machinery have been invented in the past, and some of them have been described and illustrated in the "Queensland Agricultural Journal." One machine was invented and built in Brisbane some years ago,

Plate 15.—Stukenborg Electric Cotton Picker.

and its work was demonstrated by the inventor, Mr. Daniel Jones, a cotton-grower in West Moreton in the days when cotton-growing was taken up and appeared to have become an established industry in Queensland during the Civil War in America. The machine did fairly good work, but shared the fate of most of its predecessors.

When the machine now to be described was invented by Mr. Stukenborg, his greatest difficulty was to remove the cotton from the brushes which swept the ripe cotton from the tree, but in this he eventually succeeded.

The crude and primitive method of picking cotton is to a very great extent responsible for the many abuses of the cotton crop, resulting in some enormous losses. Picking is the most expensive item in the production of the cotton crop. One man can cultivate as much cotton as five or six good pickers can gather. This is almost prohibitory; therefore the labour required to gather the crop should be equalised with the labour necessary to cultivate the crop.

Cotton picked by hand is injurious to the fibre. In pulling it from the boll the action of the fingers on the fibre as it accumulates in the hollow of the hand puts it through a twisting, rolling, matting, and squeezing process, and when placed in the sack or receptacle it resembles snowballs. Also, the fingers take in all the dirt, leaf, and trash, and mix it through and through the cotton fibres, so that it becomes very difficult to remove, and it *must be removed* before the spinning operation takes place. Hand pickers leave the cotton in a terrible condition. To make matters worse, it is again abused by being dumped here and there, only to be tangled, wadded, and pressed all the more compact; and therefore it cannot cure itself properly. It is then taken to the gin to be assassinated, which destroys much of its value, divisibility, durability, and strength. Being in that condition, there is little doubt that the gin

saws will cut and tear the fibres all to pieces, affecting materially the uniformity of staple, grade, and classification. Hence the producer pays the price in a lesser price received for his cotton for want of a good mechanical cotton-picker.

Such a machine has apparently been invented, and is known as "The Stukenborg Cotton-Picker." It is not merely an experiment, but a real machine which coaxes the cotton out of the boll. It does not injure the fibre as is done by hand-picking. The lint on each seed is more or less cleaned, straightened, and laid parallel. This gives the cotton an opportunity to dry and cure properly, and it emerges fluffy, white, and free of all foreign matter such as boll-dirt, leaf, parts of stalk, and sand.

The machine pulls the cotton from the bolls by means of two cylindrical brushes revolving inwardly, and the cotton is combed from these by a cylindrical take-off device.

There are four picking tubes to a machine. Supported overhead by a balance arrangement, the pickers are suspended with such lightness and flexibility that even a child could shift them about with ease. The machine, as it passes through the field, can pick eight rows. A labourer finds no trouble in using it; and in checking up his work it has been found that where he formerly picked 100 lb. by hand he has been picking 400 lb. by machine with only a few days' training. Each machine carries a complete electric power plant. The tractor engine furnishes sufficient electric power to operate the eight motors required to run the machine. The brushes in the leads are driven by a flexible drive-shaft about 3 feet long, which is connected to a small motor suspended about halfway down the suction tube. After the cotton completes its trip through the tube, and just before it drops into the bag, it is given a thorough cleaning, another motor operating a blower as well as supplying the suction power.

We have not seen the above-described machine at work, and therefore what is here stated is necessarily matter supplied by a pamphlet explaining its mechanism and method of picking the cotton. If what is stated in the brochure is correct—and we are not in a position to criticise the statements therein put forward—then the sooner one or two machines are sent by the company to Queensland, to be given a fair trial, the better for the company, should conditions here enable its work to be carried out profitably to the cotton-grower.

BASIC SLAG PROBLEMS.

The "Planter's Chronicle," Cormbatore, India, states that a committee of the Ministry for Agriculture which has been investigating this question obtained returns from steelmakers of their production of slag in 1920, and found that something like only a sixth of the amount of high basic slag turned out before the war is being produced now, and that even this small amount cannot be relied on in the future. There is, however, a larger output of lower grades of slag than in the pre-war period.

The 260,000 tons of high-grade slag of pre-war days contained 9,880,000 units of phosphate.

The 700,000 tons of slag produced in 1920 contained 15,200,000 units, and 560,000 tons out of this quantity, with 13,400,000 units, were of grades containing 15½ per cent. and upwards of phosphates.

It is agreed that practically the whole of the phosphorus entering the ironworks is accounted for in the figures given above. It follows that if the output of steel remains constant, the slag figures will remain substantially as they are, except that the highest grades will tend to become scarcer and the others proportionately to increase.

Dr. E. J. Russell, of Rothampstead, reports that the basic slag produced to-day is very inferior to that produced in 1914, which gave 40 per cent. of phosphates. This is attributed to the changed methods of producing steel. "Open-hearth" basic slag yields only 15 to 30 per cent. of phosphates. Some of it was of the same solubility as that of 1914, and gave proportionate results, but the fluorspar slag produced at present is much less soluble and not so efficient. Dr. Russell does not see much prospect of improvement, for the reason that the slag is worth only a few shillings to the manufacturer while the steel is worth pounds.

In the pre-war days farmers were advised to use only slag of high solubility, and that sold by the best firms had a solubility of 80 per cent. and upwards; but now that the process of manufacture has changed, experts are no longer agreed as to the desirability of a high soluble slag. The latter will come into action sooner than slag of lower solubility, and so a larger return may be expected in the first

season. It is possible, however, that in later seasons the lower-soluble slag may grow in effectiveness, and at the expiration of some years there may be a little difference between the two; this has been considered to be proved by actual experience.

A fertiliser has been put on the market under the name of "Slag phosphate," which is a mixture of low-grade basic slag with Nauru phosphate, ground to a fineness of only 60 to 70 per cent., and sold as containing 45 to 50 per cent., or 50 to 55 per cent., of phosphate of lime, no statement being made by the vendors on the invoices as to their solubility. Actually none dissolves in water in the same manner as the soluble phosphates in superphosphate dissolve, and on testing the mixture called slag phosphate in 2 per cent. citric acid, an analyst found that only 13½ per cent. dissolved, out of a total of 52 per cent. of phosphate. It is evident, therefore, that when submitted to the same laboratory test, high-grade slag is about three times as soluble in citric acid as the slag phosphate. Though this test cannot be taken as a measure of the fertilising value of the two phosphates, it does indicate that phosphate of lime in the slag will often be more quickly effective than that in the mixture.

"Ephos" Phosphate.—A fertiliser sold under this name is a natural phosphate from Egypt, containing 62 per cent. of insoluble phosphate and 20 per cent. of carbonate of lime, with a fineness of 84 per cent. It has been shown from actual experiments to yield results comparable with those obtained from basic slag, but less effective than those obtained from equal quantity of superphosphate, owing to the soluble phosphate content of the latter.

THE HUMAN MACHINE ON THE LAND.

Mr. W. J. Malden, who writes on this subject in "The Journal of the Ministry of Agriculture" (London), is evidently a man who has had large experience in farming and in the training of what he calls "the human machine" for farm work. Following are short extracts from this paper, which appeared *in extenso* in the journal mentioned:—

"It is not necessarily the strongest labourer who does the most work or who is the least tired at the end of the day. Much labour at the present time employed in arable farming is inefficient, and consequently energy is misdirected. Assuming that 100 per cent. represents the efficiency of a labourer of all-round skill, the average for the whole country to-day (in European Britain) is not more than 60 per cent. Something like £100,000,000 is paid yearly in wages. Forty per cent. wasted through inefficiency is a big charge on the land and on the country. When several millions of acres went from the plough in the 'eighties and 'nineties of the last century, and the rural population largely drifted into the towns and industries, the farmers lost a big portion of the highly skilled men and many of their more promising sons. Roughly, £1,000,000,000 was estimated to have gone out of farms and land capital in those years, and a proper wage reward could not be paid to the labourers. The war made a heavy call on the man on the land, and many skilled labourers have, as a result, been lost to the industry.

"Without skilled labour full farming cannot be carried on, but what signs are there that anything is being done to train men to a higher efficiency? Yet the time must come when much of the land will go out of cultivation, unless workmen be endowed with more skill. We are in a fairly mechanical stage on the land, and, doubtless, invention will come further to our aid; but though a percentage of trained mechanics will be required, it seems perfectly safe to state that, in a few years, a highly-skilled farm worker will command very high wages. The skilled man on the land, able to turn to any kind of live stock, good in the hay-time and harvest, a skilled hedger, in fact not lost anywhere, has become a very rare man. If he can do a few of these things really well, he can pretty well make his own terms and he will be in greater demand as years go on.

"In many districts labour has so fallen in skill that farmers have accepted a very low standard, being, in fact, glad of anything that will see them through at all. The farm worker has descended very much from a farm artisan to a farm labourer; he is often possessed of little skill, and, having little joy in his work, cannot take the pleasure in it that his fathers did. Work done in that way becomes drudgery.

"In saying this one makes many exceptions. In all ways, something is needed to bring about better conditions, to give the farm workers a greater interest in their occupation, and to make their lives more valuable to themselves and to others. Interest must be aroused in their work. They should be made skilled so that they may feel an honest pride in their work just as they should in their play.

"FARM LABOUR AS FARM ATHLETICS.

"I have always regarded physical work on the land as farm athletics. This is probably due to the fact that I was reared in a district where work was exceptionally skilled, and where competitions in the arts of husbandry excited as much interest as a local football match does to-day. As a native of Bedfordshire, I was brought up under the direct influence and outcome of those remarkable historic Woburn sheep shearings which began towards the end of the 18th and continued into the 19th century. It was in them that the great effort of the Dukes of Bedford, Coke of Holkham, Ellman of Glynde, and other giants of those days set themselves to wake up farming from the sleep in which it had slumbered for some centuries. These gatherings were notable in that they instituted in a broad manner competitions by workmen in acts of husbandry. These farm workmen's competitions acquired world-wide repute, and before the 19th century opened, a few county agricultural societies were founded, mainly to further skill in farm labour. Naturally from immediate association Bedfordshire inaugurated a society; and until quite late in the century, when hard times in farming stopped them for a few years, the competitions aroused the greatest enthusiasm, and exercised a big influence. Farmers and workmen shared equally in the spirit of emulation aroused, and the county ploughing matches even sixty years ago were the hunting ground where the large agricultural machinery firms sought men of skill and resources to be taken to demonstrate the value of their implements and machines throughout the world. Further, the market gardens and the seed-growing areas in the Biggleswade and Potton district developed men of skill in the handling of tillage tools. Thus, in that and the surrounding counties, arose an all-round skill hard to excel. Skill made work easy to the men, competitions aroused enthusiasm, and enthusiasm led men to work with a will. It was not a question of one man being set apart to do a particular job; every man expected to be an all-round hand.

"SUGGESTED INTER-COUNTY COMPETITIONS.

"There are many men farming successfully to-day who owe their success mainly to taking up farms where their predecessors had trained the men to skilled work. Had they not found them they could not have trained them. It is of little use to find fault with bad work if one cannot show the man the right way. In rather a widely varied life on the land I have found nothing so valuable to me as those few years when I took part in and learned farm work from the skilled artisans amongst whom fate threw me, and every youth going on to the land should make as much study of it as of any other section. I should like to see teams of young farmers of one county challenging those of other counties in a wide range of acts of husbandry; inter-county contests between the farm workmen, with a challenge shield for the best county; and inter-school contests between schools in different districts. It would be far more exhilarating than seeing two parishes playing indifferent football! Few have thought what a lot may be learned in farm work in a village school playground; and how a simple training may teach much that is useful. All sports and physical work should be learnt when one is young."

(TO BE CONTINUED.)

PROTECTION OF SHEEP FROM BLOWFLIES.—II.

REPORT OF THE SPECIAL BLOWFLY COMMITTEE OF THE INSTITUTE OF SCIENCE AND INDUSTRY.

JETTING.

As is well known, the blowflies generally attack sheep on the breech. So frequently is this the case that it is often taken for granted that if the breech is protected the sheep is protected. In the past some protection was obtained by clipping the wool from around the breech, called "crutching"—an expensive operation, and particularly rough on ewes carrying lambs, and not much protection in a bad fly attack.

Early in the year 1912 the manager of Orion Downs Station, in Queensland, protected the breech by poisoning the wool around it with one of the proprietary arsenical solutions. To get the arsenical solution to penetrate the wool to the skin he forced the solution through a small jet at a fairly high pressure. He thus obtained better protection than with crutching, and at a lower cost. The method

was tried out later at the Government Sheep Experimental Station at Gindie, in Central Queensland, and good results were obtained there.

When the experiments were started by the Institute of Science and Industry Committee, at Dalmally, this method of protection, which through the method of application had come to be called "jetting," was closely investigated. Practically all the specifics on the market were tried, and some of them many times and at different strengths. Only those containing arsenic gave protection, and the protection was found to be proportional to the arsenic present. At the same time, experiments were made by jetting the sheep with a solution of plain commercial white arsenic dissolved in soda ash. It was found that this was not only very much cheaper than any made-up specific, but was easier to work, and gave better protection.

After many hundreds of experiments and jetting many thousands of sheep, we have found, contrary to general belief, that comparatively strong solutions of arsenic not only give the best protection but are absolutely harmless to the sheep or to the quality of the wool. Our experience has since been verified by the use of the process in Queensland by pastoralists on many hundreds of thousands of sheep each year. In our experiments the proportion of arsenic was never taken for granted, even when most carefully made up. A sample of every solution used was invariably sent to the Government Analyst in Brisbane, and the proportion of arsenic was determined by analysis.

On one occasion fifty sheep were jetted with a 1.5 per cent. solution of arsenic, without any symptoms of poisoning showing. Thousands have been jetted with a 1 per cent. solution, and in not a single instance was any harmful result noted. Experimental flocks of sheep, when jetted, were always accompanied in the paddocks by about fifty sheep not treated in any way, so that comparisons might be made as to the protection given.

STRENGTH OF SOLUTION.

As a result of the investigation, we found that a strength of 0.7 per cent. of arsenic gave sufficient protection, but less than that strength only protected for a shorter time.

TIME OF PROTECTION.

In ordinary weather, jetting with a 0.7 per cent. arsenic solution will protect for three months or more, but in very wet weather the arsenic may be washed out more quickly. Reattack, necessitating rejetting in six weeks is the shortest period of protection we have noted.

MAKING UP SOLUTION.

We have found the grey arsenic supplied by the State Government quite pure enough for this work, as it averages about 93 per cent. and is very much cheaper than the ordinary white arsenic. Commercial soda ash dissolves the arsenic readily. To make 100 gallons of solution, the water is boiled and 14 lb. of soda ash are added. While the water is still boiling, 7 lb. of white arsenic (or 7½ lb. of grey arsenic, to allow for impurities) are added, and the mixture is boiled for twenty minutes. After standing to cool, there should be no sediment if white arsenic is used, and only a slight greyish sediment if grey arsenic is used.

MACHINE.

A pump to deliver the solution at from 60 lb. to 200 lb. pressure per square inch is required. The pump may be run by a special engine or from the shafting of the shearing machinery where that is available. With the pump at the middle of the race, a 30-feet hose will reach each end.

SIZE OF JET OR NOZZLE.

Jets wear quickly where sulphur is used, as it was in many of the earlier experiments with made-up specifics. One-sixteenth of an inch has been found most effective, though, with dense-woolled, full-fleeced sheep, a three-thirty-seconds jet is better.

PRESSURE.

The pressure required varies with the amount and density of the wool and the amount of burr and seed on the surface of the wool. With from four to six months' wool, about 100 to 125 lb. pressure has been found best; and, with a full fleece, about 200 lb.

MAINTENANCE OF PRESSURE.

It is very important to maintain a steady pressure. A large air-chamber is essential, and it must be absolutely free from leaks, so that the gauge will show a steady pressure when jetting sheep after sheep.

AMOUNT TO USE.

About a pint and a-half will be found sufficient for each sheep, the amount varying with the growth of wool.

HANDLING THE SHEEP.

The sheep should be penned in a race about 60 feet long by 2 feet 9 inches wide by 2 feet 9 inches high. The race should be floored with 3-inch round rails, which project about 18 inches to give a working platform. The flooring should have a fall of about an inch and a-half away from the operator to keep the drainage away. The cost of the arsenic solution is so low in this method that it is not essential to catch and again use the small amount of drainage.

TIME TO JET.

If ewes are due to lamb and the fly is not about, jet as close to lambing as is advisable. In other sheep, jet as soon as the fly attack begins. This will stop all infestations, kill innumerable flies, and generally give immunity till that particular fly attack finishes. Up to 3,000 per day can be jetted by four men with a plant such as described above.

COST.

The cost of this method of protection has been found to be very low, the jetting solution, prepared as above, costing about one-fifth of a penny per sheep. Three jettings per annum, therefore, means three-fifths of a penny per head per annum—quite a reasonable cost.

RISKS.

Arsenical solutions are always dangerous. If carelessly made up, when too weak they will give no protection; when too strong they may cause poisoning. With ordinary care in weighing the arsenic and soda and measuring the water, there is no risk of loss. In jetting many thousands of sheep with solutions containing from 0.7 to 1.0 per cent. of arsenic we have not had a single case of poisoning.

OTHER EXPERIENCE.

Many pastoralists have found this method gives good protection. Here is one instance:—Mr. Linton, of Mount Abundance, whose sheep—full-woolled hogget ewes—were badly struck, applied to Mr. Russell, who gave him all information. Mr. Linton used the solution as directed, and on the shearing board, in six weeks, out of 12,000 hoggets, only three were found to be struck, while sheep on surrounding stations were still being attacked.

In regard to the poisoning of flies, we reason thus:—The fly must get rid of her burden of eggs or larvæ. It is mostly the breech which is attacked. If the larvæ are deposited on poisonous wool they cannot thrive. This has been shown conclusively by repeated experiments. Then, instead of deterring the fly from attacking the breech, let us attract her there, or she will attack other parts of the body of the animal. In short, we shall make a fly-trap of every sheep attacked—a cheap and effective trap—for past the poison there are no live larvæ to develop into flies.

PURITY AND GERMINATION OF AGRICULTURAL SEEDS.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

Under the Pure Seeds Acts the seller must give to the buyer an invoice, stating the kind or kinds of seeds and that such seeds contain no greater amount of foreign ingredients than is prescribed by the Regulations. It therefore follows that every vendor should know the purity and germination of the seeds that he is selling or offering for sale. Without this knowledge he cannot honestly give the required invoice.

A vendor is any person who sells, or offers or exposes for sale, or contracts or agrees to sell, or deliver any seeds. In other words, an Auctioneer, Storekeeper, Produce Merchant, Seedsman, Grower of the seed, or any other persons, are vendors whenever they sell or offer for sale any seeds as seeds for sowing. Section 6 of the Regulations provides for the sale of "As grown" seeds to seed merchants to be cleaned and graded by the merchant before being offered for sale as seed for sowing. The sale by farmers of "As grown" seeds is therefore limited to such merchants as are in possession of one or more efficient seed-cleaning machines. A farmer is a vendor under the Act whenever he sells to another farmer or to any other person, and must give an invoice, as required by the Act. The only exception is the sale of "As grown" seeds to merchants for cleaning and grading.

Every purchaser should know the purity and germination of the seed that he intends to buy or sow; also its freedom from diseased or insect-infested seeds. These matters can only be decided by a thorough examination of a large and truly representative sample drawn from the actual bulk in the sender's possession. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops, may be wholly determined by the kind or condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the *purity* and *germination* of all seeds purchased, before sowing or offering them for re-sale.

Both buyers and sellers may send samples to the Department of Agriculture and Stock for analysis. When the information is required for commercial purposes a fee of 2s. 6d. per sample is charged. No charge is made to farmers sending in samples of the seeds that they have purchased for their own sowing, providing the following particulars are plainly written on each sample:—

(1.) Vendor's name and address.

(2.) Name of seed.

(3.) Quantity purchased.

(4.) Date of delivery.

(5.) Locality where seed is to be sown.

(6.) Name and address of purchaser.

If the sender of the sample has not omitted to put his name and address thereon (and hundreds of such samples reach the Department every year), a reply is sent in the form of a report, or certificate, which gives particulars as to the purity and germination of the sample received. Unless the sender is careful to forward a truly representative sample, the reply is valueless. Under no circumstances is it a guarantee of the bulk, but a plain statement of the facts revealed by the analysis of the sample received.

A certificate gives the following particulars:—Percentage of pure seeds, inert matter and weed seeds, ascertained by weight; also the names of the principal weed seeds, and the percentage of dead and non-germinable seeds that the pure seeds contain, ascertained by a germination test; and in the case of such seeds as lucerne and cow peas, the percentage of hard seeds. Hard seeds are seeds with coats so impervious to water as to delay germination. If the amount of hard seeds is more than 10 per cent., it is obvious that the effective germination of the sample is greatly reduced.

The percentage of germination is not given in the certificate, but if the percentage of dead and non-germinable seeds in lucerne amounted to 15 per cent., and the amount of hard seeds to 10 per cent., the germination would be 75 per cent.; in other words, 15 per cent. plus 10 per cent. deducted from 100 leaves 75 per cent. The percentage of purity is the percentage of pure seeds that the sample contains; if a sample contained .7 per cent. of weed seeds and 1.3 per cent. of inert matter, the purity is 98 per cent., as the amount of weed seeds plus the amount of inert matter amounts to 2 per cent., which figure, deducted from 100, leaves 98. The real value of a sample, or the number of pounds of pure germinable seeds that the sample contains, can be arrived at by multiplying the purity by germination and dividing by 100. As an example, we will suppose a farmer purchases 100 lb. of Rhodes grass seed at 1s. 6d. per lb., which on analysis is found to contain $\frac{1}{2}$ of 1 per cent. of weed seeds, and $1\frac{1}{2}$ per cent. of inert matter, and the pure seeds have a germination of 60 per cent., the real value of the seed would be $98 \times 60 \div 100 = 58$ lb. Putting it in another way: the farmer who sows the seed gets a sample containing 58 per cent. by weight of Rhodes grass seed, which under favourable conditions will germinate. Supposing he purchases a similar quantity from another source and received seed with a purity of 43 per cent. and a germination of 13 per cent., the actual value of the seed would be $43 \times 13 \div 100 = 5\frac{1}{2}$ lb. The buyer who purchases 100 lb. of the first sample, at 1s. 6d. per lb., pays £7 10s. for 58 lb. of germinable seed, or 2s. 7d. per lb. for the good seed. With the second sample, at 1s. 6d., he would pay £7 10s. for $5\frac{1}{2}$ lb. of seed, or 27s. 3d. per lb.

It is obvious that the best is cheapest, and quality should be the one and only consideration that determines a purchase.

FOREIGN INGREDIENTS.

Foreign ingredients include dead and non-germinable seeds, hard seeds, diseased or insect-infested seeds, weed seeds, or seeds of any cultivated plant other than that to which the sample purports to belong. Also inert matter, which includes chaff, dust,

stones, or any material other than seeds, and broken seeds less in size than one-half of a complete seed.

The percentage of weed seeds, inert matter, dead and non-germinable seeds, and other foreign ingredients that may be contained in the different kinds of seeds are prescribed by the Regulations, copies of which may be obtained from the Department of Agriculture.

"B" grade seeds are seeds in which the amount of foreign ingredients exceeds the proportion set forth in Schedule A of the Regulations, but does not exceed the proportion set forth in Schedule B, such seeds may be sold as seeds for sowing, providing they are contained in bags or packages to each of which is affixed a label, brand, or stamp, clearly and indelibly marked, specifying: The kind or kinds of such seeds; that the seeds are "B" grade, for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed; also the name and address of vendor. All invoices relating to such seeds must be distinctly marked "B" Grade Seeds.

INVOICE MUST BE GIVEN BY VENDOR.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

> "The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds."

WEIGHT OF SAMPLES.

All samples of seed sent for analysis must not be less than the weights herein set out, and in the case of seeds containing foreign ingredients double the weight mentioned should be sent.

Wheat, Oats, Barley, Maize, Rice, Rye, Cowpeas, Tares, Peas, Beans	**8 oz.**
Lucerne, Sweet clover, Sorghum, Sorghum sudanense (Sudan grass), Panicum, Millet, Linseed, Canary, Prairie grass, Buckwheat, Cotton	**4 oz.**
Rhodes grass, Paspalum dilatatum, Rye grass, Cocksfoot, Couch grass	**2 oz.**
All agricultural seeds other than those included above	**2 oz.**

It is of the utmost importance that the samples be drawn by the sender from the seed in his actual possession, care being taken to obtain a small lot from each bag, carefully mixing them together in order to make the sample truly representative of the bulk. All samples must be marked with **name of seed, quantity it represents, marks (if any)**, and last, but not least, the **name and address of the sender.** Unless these particulars are plainly written on the sample delay will ensue. A covering letter should be mailed advising of the despatch of the samples, and enclosing the fees, if such are payable.

Although buyers and sellers are able to form a good idea of the market value or price, experience shows that they are frequently misled as regards purity and germination. It is impossible to determine the amount of weed seeds, non-germinable seeds, hard seeds, or inert matter other than by a purity analysis and germination test conducted under uniform scientific methods. Any opinion as to the quality or condition of any agricultural seeds is useless unless based on the examination of a truly representative sample. This work is undertaken by the Seed Laboratory of the Department of Agriculture.

Before sending any samples, care should be taken to see that the required particulars are plainly written thereon in ink.

COVERING LETTER.

All samples with *covering letter*, should be addressed to—

The Under Secretary,
Department of Agriculture and Stock,
Brisbane.

SEED MAIZE FOR SALE.*

To growers desirous of obtaining a pure and reliable strain of improved seed, the following varieties are being offered and represent limited stocks raised from selected strains of Departmental seed:—

Yellow.—

Eureka Yellow Dent.
Reid's Yellow Dent.
Funk's Yellow Dent.
Improved Yellow Dent.
Funk's 90-Day.
Golden Beauty.
Star Leaming.

Red—

Red Hogan.

CONDITIONS OF SALE.

Applications for seed, with accompanying remittance (exchange added), should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane. Postal address and name of Railway Station should be given.

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed, should any matters require adjustment.

Should the variety asked for be out of stock, the Department may substitute another variety unless the applicant indicates a desire to the contrary.

PRICES.

To enable applicants living at a distance to benefit, a flat rate of 12s. 6d. per bushel is being charged. This price includes all railage to the nearest railway station, but, where steamer freight is necessary, this and any charges in relation thereto must be paid by the purchaser and the cost thereof added to the remittance.

DESCRIPTION OF VARIETIES.

Eureka Yellow Dent.—Recently imported by the Department of Agriculture, and has given very satisfactory results. It is a fairly short-growing, quick-maturing variety, taking about four months to mature. The ears are situated low on the stalk, are weighty, of medium length, and carry from sixteen to eighteen rows of very tightly packed, amber-coloured, slightly pointed grain, having a rich yellow cap and rough crease dent.

Reid's Yellow Dent.—Moderately tall-growing, medium-early variety—four months. The ears are cylindrical in shape, of good size, carrying from eighteen to twenty tightly packed rows of medium-sized, slightly pointed, wedge-shaped grain, which is of a golden colour, with dark amber base and slightly rough crease dent. The stalks are light and leafy. It is suitable for the production of early crops, or for districts where there is a short growing season. It is also a good fodder corn.

Funk's Yellow Dent.—Medium-early variety of moderately tall growth, taking about four months to mature. The ears are of a good size, and cylindrical in shape, with sixteen to twenty tightly packed rows of grain. The grain is of medium size, with square shoulders, and is thick-bodied, with a characteristic crease dent; is light amber in colour, with a cream-coloured cap. The husk covering is fair. Like Reid's, it is suited for early crops, or districts which have a short growing season. It is a very hardy variety, a good yielder, and also a good fodder corn.

Improved Yellow Dent.—A tall-growing, late-maturing variety—five to five and a-half months. The ears are cylindrical in shape, carrying sixteen to eighteen tightly packed rows. The grain is deep, wedge-shaped, of rich amber colour, with a yellow tip cap and rough crease dent. It is suitable for coastal districts and scrub lands where there is a good rainfall. It is capable of giving heavy yields of grain and fodder. Special strains of this seed have yielded over 100 bushels per acre under field conditions.

Funk's 90-Day.—This is a recent importation of special seed maize, and was propagated by the Department of Agriculture for the purpose of bringing the variety into cultivation, as a high-yielding, reliable type of maize of this description is required to meet the existent demand. As the name implies, it is a very early maturing variety. The ears are cylindrical in shape, with fourteen to sixteen very

* All previous lists are cancelled.

closely packed rows of grain. The grain is plump, of good depth, and slightly pointed; it has an amber-coloured base, with a rich yellow cap and crease dent.

Golden Beauty.—This variety is a tall-growing, medium-late variety—four and a-half to five months. The ears are long, with very small core, and usually twelve rows of grain. The husk covering is good. The grain is flat, of medium depth, with slightly rounded shoulders; bright amber in colour, with cream-coloured cap and long crease dent. It has a very high shelling percentage, is a very hardy variety, and a splendid yielder. It is also a good fodder corn.

Star Leaming.—This is a fairly short-growing, medium-early variety, taking about four months to mature. Ears carry from sixteen to twenty rows of grain, are borne fairly low on the stem, and are weighty and very compact. The grain is of medium size and blunt-wedge shape; bright amber in colour, with a distinct yellow cap and a rough crease dent. It is one of the best of the early varieties; is very suitable for early or catch crops, a heavy yielder, and a very popular variety.

Red Hogan.—This variety is a fairly tall-growing, late-maturing variety—five to five and a-half months. The ears are large, with usually sixteen rows of well-packed grain. The husk covering is good. The grain is very deep, wedge-shaped, from reddish yellow to light red in colour, with a distinct yellow cap and a rough crease dent. It is a favourite high-yielding variety, well adapted for rich alluvial soils, and suitable for districts with a good rainfall.

HORTICULTURAL NOTES.

By E. W. BICK, Curator, Botanic Gardens.

Some very seasonable weather has been experienced recently. The cold nights have had an appreciably good effect on insect pests, by keeping them within bounds. They are not nearly so prevalent as in what may be termed a very mild winter similar to that experienced last year. The showers of the past few weeks have also been beneficial. The moisture at this time of year, being slow of evaporation, lasts much longer than in summer, and encourages good winter growth. Cinerarias are better than usual, and will require feeding with liquid manure or fertiliser to obtain the best results. Keep them moving, and keep a keen lookout for insect pests such as caterpillars and aphis. Both these attack the plants from the underside of leaves, where only a few are grown. A rubber or tin puff "ball" is a good thing to use in their extermination. Fill it with insecticide powder or powdered tobacco dust—the old-fashioned snuff does capitally—and blow it over the underside of leaves; or a strong tobacco-water spray may be used with good effect.

Rose planting should be finished as soon as possible. Keep the newly-planted ones moist, and don't allow the soil around plants to become dry and caked. The surface should be kept broken up. This is a good time to put in cuttings of shrubs such as hibiscus, acalyphas, lagerstroemias, as well as frangipani, and towards the end of the month poinsettias and bougainvillea cuttings may be put in, when the plants go out of flower. Choose good strong well-ripened wood for cuttings, placing them well in the ground. At least two-thirds of the cutting should be in the soil. A fine effect may be obtained with the brick-red *Bougainvillea laterita*, or the pink one (*B. rosea*). When grown as hedges they can be kept trimmed, and with proper attention they will flower profusely. Should any tree-planting be contemplated, get them in as soon as possible, and remember that they will well repay good preparation of soil. Do not plant in a little pot-hole barely large enough to get the plant in as it comes out of the pot, but break up the ground thoroughly, and don't forget that many of the native trees, such as crow's ash, flame tree, wheel of fire, *Barklya syringafolia*, and silver wattle are far better than many of those trees often planted. Get away from the camphor laurel habit, and plant something useful as well as ornamental in small gardens.

Bourvardias were often seen in gardens some years ago, but their cultivation has apparently lapsed somewhat. They are beautiful flowers, and well worth a little trouble. They delight in a rich, free, well-drained soil and a rather sheltered situation, where they would not get much of the afternoon sun, for preference. They are very free-flowering and may be obtained in about a dozen varieties of white and pink, both single and double flowers, and are particularly suitable for small gardens.

A start may now be made with the sowing of seeds of summer flowering annuals, such as aster, amaranthus, celosias, calliopsis, coreopsis, clianthus, petunias, nicotiana, sunflowers, and zinnias.

RIPENING BANANAS IN AIR-TIGHT CHAMBERS.

The following information was recently supplied by Mr. A. H. Benson, Director of Fruit Culture, to inquiries received by him on this subject:—"The chambers used for ripening bananas in Brisbane are usually about 6 feet by 6 feet by 6 feet, and are made of the best quality tongued and grooved inch pine. They are usually fitted inside with two shelves, so that three tiers of bananas can be treated at once—namely, one on the floor and one on each shelf. A chamber of this size will hold from 100 to 130 bunches according to size. The heat is obtained from a gas ring or an oil stove. The temperature is raised to about 85 degs. Fahr. This will take about six hours, but the exact time depends on the temperature of the fruit and on that of the outside air. Once the fruit has been raised to 85 degs. the period of ripening can be regulated so that if desirable the fruit can be brought out quicker or delayed according to the raising or lowering of the temperature.

"No heat is used during the summer months, the fruit is simply stacked in an air-tight chamber."

GRAPE CULTURE IN QUEENSLAND.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

Part III.

PRUNING THE VINE.

Pruning is one of the most important vineyard operations, and one that requires not only a thorough knowledge of the different habits of growth of the many varieties of grapes but also the possession of considerable mechanical skill or dexterity in the actual performance of the work itself.

The work of pruning is best done by means of a pair of secateurs and a suitable pruning-saw. The former should be strongly made and possess a well tempered cutting blade that can be kept very sharp and that is capable of cleanly severing wood up to 1 inch in diameter. Anything larger will require a saw. Pruning is necessary, in the first place, to shape the vines so that the vineyard can be worked to the best advantage; and, in the second place, in order to provide an annual supply of new fruiting wood. The wood on which the fruit is borne is produced from wood of the previous season's growth, which in its turn was produced from still older wood; so that it will be seen that there must be wood of at least three different season's growth on the vine before it will bear fruit. In starting a vineyard, therefore, the first pruning is that required to shape the vine so that it can be given the form it is to permanently assume, no matter whether it is to be grown as a bush or on a trellis. All vines are started in a similar manner, their subsequent treatment depending on the form they are to permanently assume, and on the particular type of pruning to which they are best adapted. When a vine is grown from a cutting, as previously described, it is allowed to make all the growth it can during the first year, and is not interfered with in any way. The cuttings will not, however, all make the same amount of growth. In some the growth may be several feet in length, whereas in others it may only be an inch or two; but no matter how strong or weak the growth is it must all be cut away at the first winter pruning except one cane, which is cut back to not more than two buds, from which the following season's growth will be produced.

The following illustrations, which have been taken from the first edition of Wickson's "Californian Fruits" and redrawn by the Department's artist, will enable a beginner to see exactly how to prune a one-year-old vine. Fig. 1, represents a good growth; figs. 2 and 3, a medium growth; and fig. 4 a poor growth.

In these figures, *d* represents the top of the original cutting which was planted with two buds above the surface of the ground; *a* is the lowest shoot of each cutting, and in Figs. 1, 2, and 3 it should be cut back to two buds and all other shoots removed. In Fig. 4, shoot *b* is removed and shoot *a* allowed to remain as it is, and should be cut back the next season.

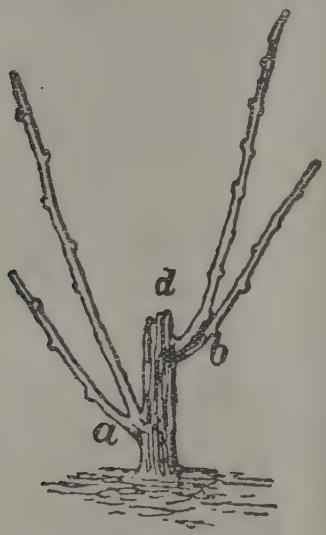

FIG. 1.

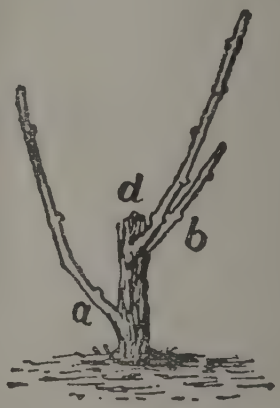

FIG. 2.

FIG. 3.

FIG. 4.

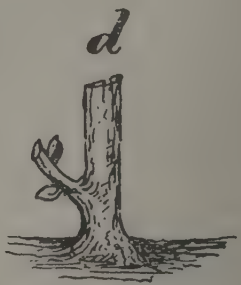

FIG. 5.

Fig. 5 shows the vine in Figs. 1, 2, and 3 when pruned (first winter pruning). From this stage the future treatment of the vine depends on whether it is to be grown as a bush or on a trellis.

In the case of the first, the vine as pruned in Fig. 5 should throw out three or more strong canes during the second season, and in order to keep these canes from spreading all over the ground they should be tied to a strong stake that has been provided for this purpose.

This stake should be not less than 2 in. square, and about 5½ ft long. It should be set at least 1 ft. in the soil, and should be made of durable hardwood. In the western districts, where white ants are troublesome, it should be made of cypress pine.

The vine should be allowed to make all the wood it can during its second season's growth, and the following winter it should consist of

two or three main canes with more or less lateral growth. Fig. 6 shows a growth of three shoots without laterals, and of these the best and straightest *a* is to be retained to form the future trunk of the vine, and *b* and *c* are to be cut clean away.

The cane *a* is then cut back (second winter pruning) to the height at which it is desired to form the head of the vine, which in the case of raisin grapes grown in a hot and dry district should not be more than 8 in. to 10 in. from the ground. In other cases the height should be from 12 in. to 18 in. from the ground, measured from the second bud from the top—not from the top bud—as the second bud fixes the height of the trunk.

Fig. 6.

Fig. 7.

Fig. 7 shows the vine when pruned. In order to produce a clean trunk, free from scars, all the buds other than the three top ones should be rubbed out, and these three buds will throw out strong fruit-bearing canes.

A low-headed vine, such as that met with in the raisin vineyards of California, is not staked; and, excepting in our driest and hottest districts, this method of training is unsuited to our climate, as we never know what rain we are going to get during the ripening period. Consequently bush pruning, in which the young canes are tied to a permanent stake, is to be preferred, as the wood and fruit is kept off the ground and is thus less likely to be injured by rain.

The three strongest canes produced from the three top buds of the vine, as shown in Fig. 7, are allowed to grow till they are 2 ft. or a little more in length, when the tip is pinched back in order to develop lateral growth that will tend to shade the fruit. The three main canes are tied to the stake in order to keep them in place.

At the third winter pruning, the vines will have made a growth somewhat similar to that shown in Fig. 8, and all the growth except two

or three strong main canes is cut away, and these main canes are cut back to two eyes. Fig. 9 (third winter pruning) shows a vine pruned back to two canes, on which two eyes have been left in each, but in the case of a strong-growing vine three canes cut to two eyes each could be left. The vine when pruned shows the height of the permanent trunk, and the pruning from this on is a simple matter. All that is necessary is to take care that the vine is not allowed to carry more canes than it is able to support, and which are capable of producing good bunches of fruit. The exact number of canes to be left will depend entirely on the strength and vigour of the individual vine, and is a matter that must be left to the discretion of the vigneron. Generally speaking, if a vine is found to be making a poor growth the number of canes is reduced, and when the growth is excessive more canes are allowed to remain.

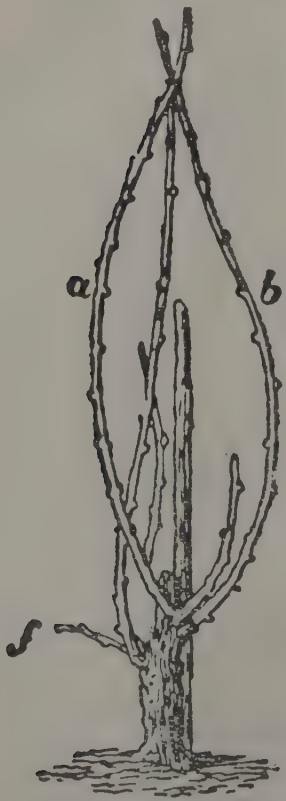

FIG. 8.

FIG. 9.

FIG. 10.

In bush-pruned vines there is frequently a tendency to allow the head of the vine to become very straggling, and to possess a number of arms more or less covered with the scars of previous years' prunings, and the bearing-wood of which is a considerable distance from the main trunk. This is a serious fault, as the straggling arms are always a serious source of danger to the health of the vine, as they tend to form a shelter for the spores of the various fungi by which the grape vine is attacked, as well as a harbour for many insects and their eggs. In

addition, the nearer the bearing-wood is to the main trunk of the vine the better the fruit, consequently it is necessary, both for the sake of the health of the vine and also for the production of first-class fruit, to see that the head of the vine is kept as compact as possible. This is done by always cutting back to the cane nearest to the main trunk and shortening back the new growth every year as far as possible. In addition to this, when the growth cannot be reduced otherwise, a shoot should be allowed to develop from or near to the original head of the vine, and this shoot should when cut back the following season produce a cane to take the place of the straggling arm, which is to be cut clean away. By using care the head of the vine can be kept within reasonable limits and old wood that has outlived its usefulness can be removed and replaced by new and more vigorous growths.

As some vines do not fruit well when short-pruned—that is, when only two eyes are left—it is necessary in their case to somewhat modify this method of pruning when the vine is grown as a bush, and this is done by leaving two or more canes of the previous season's growth from 2 to 3 ft. long, as well as an equal number of canes pruned to two eyes to produce canes on which to grow the fruit the following season. This is known as the rod and spur system of pruning, in which the fruiting cane is cut away once it has borne fruit and a new cane that has been grown from a spur takes its place, only to be replaced in its turn. This system of pruning is used both in the case of vines grown as a bush and also when they are grown on a trellis, and will be described more fully when dealing with trellised vines.

Figure 10, which is reproduced from Mr. C. Ross's pamphlet, gives a good idea of a well-grown and properly pruned bush vine in full bearing.

TRELLISED VINES.

As the pruning of trellised vines is well described and illustrated in Mr. Ross's work, to which I have previously referred, I am reproducing a considerable portion of his pamphlet that deals with this matter, as I agree with him that the unilateral cordon or long rod with spurs or "Royat" is not only the simplest method of trellising vines, but is the one that is best adapted to our local conditions. It consists of one long permanent rod, which can either be spur-pruned by cutting back the canes annually to two eyes, or it can be pruned so that long fruiting canes and short spurs are left (Casanave cordon).

The first season's growth from the cutting is pruned as in Fig. 5, and should eventually produce a growth similar to Fig. 11. By judicious pinching and stopping of laterals and other shoots not required, one long strong cane will be produced by the end of summer (Fig. 11 at A). At the subsequent winter pruning all the side shoots are cut clean off, leaving only the one rod. The vines being planted 7 ft. apart, this cane should be pruned back to a little short of that length and tied down to the bottom wire of the trellis with a graceful curve. (See Fig. 12.) The bottom wire should be about 18 inches from the ground. The following winter this cane becomes a permanent rod with canes (see Fig. 13); each of these canes is then pruned to two eyes, as in Fig. 14. All spring and summer shoots arising from the neck of the vines and underside of the rod must be rigorously suppressed. The curves in Figs. 13 and 14 are too sharp and have caused the strong growth at B, which should have been rubber off on its first appearance.

FIG. 11.

The first spur on the rod should not be less than 12 inches from a vertical line of the base (Fig. 12). At the succeeding pruning it will be

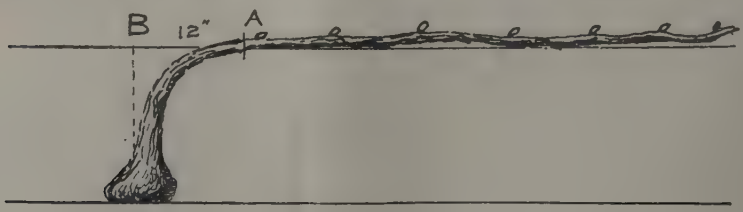

FIG. 12.

found that most of the spurs will have put forth two canes (Fig. 15); the top cane should be cut out close to the lower one, and the remaining cane pruned to two eyes (Fig. 16). Should only one cane have issued from a node, it must be pruned to two eyes. The last spur on the rod is treated differently. Of the two canes issuing therefrom, the upper one is pruned to several eyes and tied down to meet the first spur of the next vine (Fig. 16). This is called the annual terminal fruit branch, with return spur beneath, and acts as a safety valve to the superfluous sap flow, as well as a protection to the neck of the adjoining vine. The lower cane is pruned to two eyes, forming a return spur, and will furnish two canes for the following season, to be treated in the same manner. The terminal fruit branch is only an annual expedient, which is pruned off at each winter pruning and is again reproduced from the upper cane of the return spur left for the purpose.

FIG. 13.

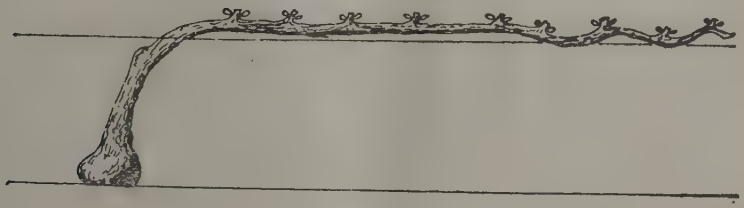

FIG. 14.

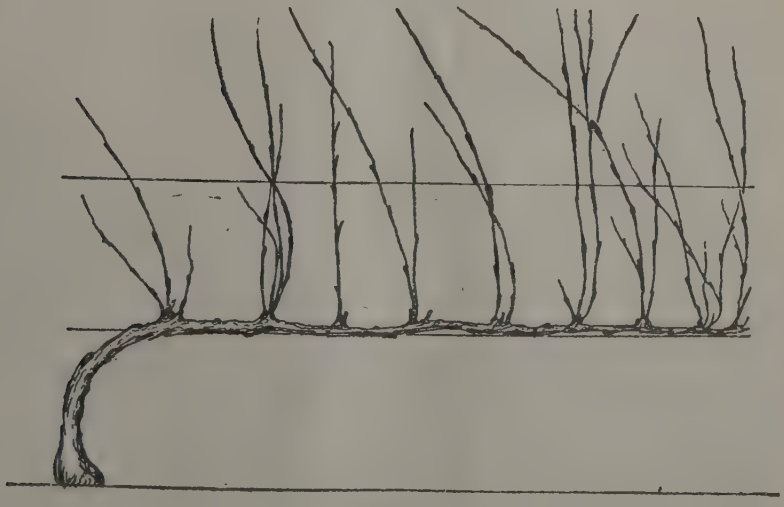

FIG. 15.

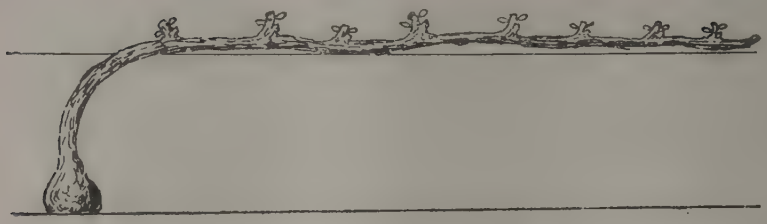

FIG. 16.

THOMERY SPALIER OR BI-LATERAL CORDON.

This is a two-armed vine, and is formed as follows:—

An upright shoot arising from a young vine in spring is pinched back before approaching the bottom wire. Several laterals will eventually push forth; the top one is allowed to grow, whilst others beneath may be pinched back at their first leaf. The lower laterals are not required except for the purpose of elaborating sap to strengthen the main stem. The following winter the cane that has been allowed to grow is pruned back to two eyes.

Several shoots may issue from this point during the following spring, and two of these should be selected and trained along the wire, one on each side, as main arms or permanent rods. Other shoots are rubbed out. At the next pruning the rods are shortened to meet those of the neighbouring vine. The canes issuing from the nodes of these two rods are pruned to two eyes as in the Royat system.

LONG PRUNING.

THE BORDELAISE SPALIER.

This is an excellent system for strong growing vines.

Select a young vine which has been pruned to two spurs. The following spring several canes will issue from these two spurs. At the subsequent pruning the upper cane, or the one situated furthest from the base of each spur, is then bent down to the wire and shortened to six, eight, ten, or more eyes, and the return spurs nearer the base are pruned to two eyes. The return spurs may produce fruit, but their chief function is to provide canes and spurs to replace the annual fruit canes already tied down, and which are completely cut out after producing their one crop. As will be observed, the object of this method is to provide new fruit rods and spurs for every year's crop.

THE CASANAVE CORDON.

The vine is pruned as a unilateral cordon. After the permanent rod has been laid down, short pruning is followed until it arrives at the stage shown in Fig. 15. The upper cane at each spur is now shortened and tied down, and the return spur pruned to two eyes. Where only one cane occurs, it should be pruned to two eyes.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR JUNE, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Hedges Nattie ...	Friesian ...	20 May, 1922	900	4·0	42·00	
Prim	,, ...	6 Feb., ,,	1,110	3·2	41·40	
College Cold Iron	Jersey ...	25 Jan., ,,	600	5·8	41·10	
Gay Lassie ...	Ayrshire ...	20 Feb., ,,	660	5·0	39	
Miss Fearless ...	,, ...	30 May, ,,	780	3·5	31·80	
Little Buttercup...	Friesian ...	12 Dec., 1921	750	3·6	31·50	
College Prima Donna	,, ...	17 Nov., ,,	630	4·3	31·50	
Dawn of Warragaburra	Jersey ...	17 May, 1922	540	4·9	31·20	
Snowflake	Shorthorn...	20 Feb., ,,	600	4·1	28·80	
Skylark	Ayrshire ...	7 Feb., ,,	540	4·5	28·50	
College Ma Petite	Jersey ...	5 Feb., 1922	450	5·0	28·40	
Auntie's Lass ...	Ayrshire ...	31 Oct., 1921	510	4·6	27·60	
Rosine	,, ...	18 May, 1922	540	4·3	27·00	
Magnet's Leda ..	Jersey ...	8 Feb., ,,	450	5·1	27·00	
Dear Lassie ...	Ayrshire ...	19 June, ,,	504	4·4	25·92	
College Evening Glow	Jersey ...	11 Oct., 1921	360	6·0	25·50	
Confidante... ...	Ayrshire ...	8 May, 1922	450	4·7	24·60	
Miss Betty ...	Jersey ...	17 May, ,,	420	4·9	24·30	
College Nita ...	Friesian ...	26 Feb. ,,	540	3·8	24·00	
College Cobalt ...	Jersey ...	3 April, ,,	420	4·8	23·70	
College Promise ...	,, ...	6 Jan., ,,	390	5·0	22·80	
College Wildflower	,, ...	10 Dec., 1921	390	5·0	22·80	
Lute	Ayrshire ...	8 Jan., 1922	540	3·6	22·50	
Sheila of Nundorah	Guernsey ...	16 April, ,,	390	4·9	22·50	
Lady Mitchell ...	Friesian ...	20 Dec., 1921	450	4·1	21·60	
College Bluebell ...	Jersey ...	22 Oct., ,,	360	5·1	21·60	
College Grandeur	,, ...	22 May, 1922	320	5·7	21·20	
Lilia	Ayrshire ...	3 Mar., ,,	360	4·9	20·70	
Buttercup	Shorthorn...	28 Oct., 1921	480	3·6	20·10	

Rainfall for the period, 103 points.

THE MYSTERY OF "ROARING RAILS."

On many of the railway systems of the world the phenomenon of "roaring rails" has been a too-familiar trouble to engineers. The surface of the rails developed ridges at regular distances of an inch or so, and these corrugations led to excessive noise and vibrations. On electric tramway systems the same trouble appeared in ever greater degree; frequently the noise was so excessive that the rails had to be ground flat at great expense—only to reveal fresh corrugations as soon as the traffic was resumed. All sorts of explanations were offered and for a long time the precise cause of the trouble remained a mystery. Now the problem has been settled by a series of experiments carried out by a committee of British experts on a tramway subway in London, where the rails and track could be altered freely so as to test the various explanations put forward. The conclusion reached is that vibration has nothing to do with the case, and that the real cause lies in the action of a very heavily loaded wheel running along the rail. This action makes the material of the rail surface "flow" into waves or corrugations very much as an ordinary road surface flows into waves under the action of a steam roller. The remedy therefore lies in the use of harder rails and, where possible, of larger wheels.—"Industrial Publicity Service," London.

TABLE OF CANE VALUES.

Under 1922 Cane Prices Boards Awards. Calculated to the nearest ¼d. When raw sugar is £30 6s. 8d. per ton; base price £2 2s. for 12 c.c.s. On receipt of c.c.s. returns from the mill, farmers will, by a glance at this table, be able to see exactly the value of their cane per ton with sugar at £30 6s. 8d. for 94 n.t.

c.c.s.	£ s. d.	c.c.s.	£ s. d.	c.c.s.	£ s. d.	c.c.s.	£ s. d.
7·0	0 15 3	10·0	1 12 6	13·0	2 6 9	16·0	3 1 0
·05	0 15 6½	·05	1 12 8¾	·05	2 6 11¾	·05	3 1 2¾
·1	0 15 10	·1	1 12 11¼	·1	2 7 2¾	·1	3 1 5¾
·15	0 16 1¼	·15	1 13 2½	·15	2 7 5½	·15	3 1 8½
·2	0 16 4¾	·2	1 13 5⅓	·2	2 7 8⅓	·2	3 1 11½
·25	0 16 8¼	·25	1 13 8¼	·25	2 7 11¼	·25	3 2 2¼
·3	0 16 11¾	·3	1 13 11	·3	2 8 2	·3	3 2 5
·35	0 17 3¼	·35	1 14 2	·35	2 8 5	·35	3 2 8
·4	0 17 6½	·4	1 14 4¾	·4	2 8 7¾	·4	3 2 10¼
·45	0 17 10	·45	1 14 7¾	·45	2 8 10¾	·45	3 3 1¾
·5	0 18 1½	·5	1 14 10½	·5	2 9 1½	·5	3 3 4½
·55	0 18 5	·55	1 15 1¼	·55	2 9 1¼	·55	3 3 7¼
·6	0 18 8½	·6	1 15 4¼	·6	2 9 7¼	·6	3 3 10¼
·65	0 18 11¾	·65	1 15 7	·65	2 9 10	·65	3 4 1
·7	0 19 3¼	·7	1 15 10	·7	2 10 1	·7	3 4 4
·75	0 19 6¾	·75	1 16 0¾	·75	2 10 3¾	·75	3 4 6¾
·8	0 19 10¼	·8	1 16 3½	·8	2 10 6½	·8	3 4 9½
·85	1 0 1¾	·85	1 16 6½	·85	2 10 9½	·85	3 5 0½
·9	1 0 5	·9	1 16 9¼	·9	2 11 0¼	·9	3 5 3¼
·95	1 0 8½	·95	1 17 0¼	·95	2 11 3¼	·95	3 5 6¼
8·0	1 1 0	11·0	1 17 3	14·0	2 11 6	17·0	3 5 9
·05	1 1 3½	·05	1 17 5¾	·05	2 11 8¾	·05	3 5 11¾
·1	1 1 7	·1	1 17 8¾	·1	2 11 11¾	·1	3 6 2¾
·15	1 1 10¼	·15	1 17 11½	·15	2 12 2½	·15	3 6 5½
·2	1 2 1¾	·2	1 18 2½	·2	2 12 5½	·2	3 6 8½
·25	1 2 5¼	·25	1 18 5¼	·25	2 12 8¼	·25	3 6 11¼
·3	1 2 8¾	·3	1 18 8	·3	2 12 11	·3	3 7 2
·35	1 3 0¼	·35	1 18 11	·35	2 13 2	·35	3 7 5
·4	1 3 3½	·4	1 19 1¾	·4	2 13 4¾	·4	3 7 7¾
·45	1 3 7	·45	1 19 4¾	·45	2 13 7¾	·45	3 7 10¾
·5	1 3 10½	·5	1 19 7½	·5	2 13 10½	·5	3 8 1½
·55	1 4 2	·55	1 19 10¼	·55	2 14 1¼	·55	3 8 4½
·6	1 4 5½	·6	2 0 1¼	·6	2 14 4¼	·6	3 8 7¼
·65	1 4 8¾	·65	2 0 4	·65	2 14 7	·65	3 8 10
·7	1 5 0¼	·7	2 0 7	·7	2 14 10	·7	3 9 1
·75	1 5 3¾	·75	2 0 9¾	·75	2 15 0¾	·75	3 9 3¾
·8	1 5 7¼	·8	2 1 0½	·8	2 15 3½	·8	3 9 6½
·85	1 5 10¾	·85	2 1 3½	·85	2 15 6½	·85	3 9 9½
·9	1 6 2	·9	2 1 6¼	·9	2 15 9¼	·9	3 10 0¼
·95	1 6 5½	·95	2 1 9¼	·95	2 16 0¼	·95	3 10 3¼
9·0	1 6 9	12·0	2 2 0	15·0	2 16 3	18·0	3 10 6
·05	1 7 0½	·05	2 2 2¾	·05	2 16 5¾	·05	3 10 8¾
·1	1 7 4	·1	2 2 5¾	·1	2 16 8¾	·1	3 10 11¾
·15	1 7 7½	·15	2 2 8¼	·15	2 16 11½	·15	3 11 2½
·2	1 7 10¾	·2	2 2 11½	·2	2 17 2½	·2	3 11 5½
·25	1 8 2¼	·25	2 3 2¼	·25	2 17 5¼	·25	3 11 8¼
·3	1 8 5¾	·3	2 3 5	·3	2 17 8	·3	3 11 11
·35	1 8 9¼	·35	2 3 8	·35	2 17 11	·35	3 12 2
·4	1 9 0½	·4	2 3 10¾	·4	2 18 1¾	·4	3 12 4¼
·45	1 9 4	·45	2 4 1¾	·45	2 18 4¾	·45	3 12 7¼
·5	1 9 7½	·5	2 4 4½	·5	2 18 7½	·5	3 12 10½
·55	1 9 11	·55	2 4 7½	·55	2 18 10¼	·55	3 13 1¼
·6	1 10 2½	·6	2 4 10¼	·6	2 19 1¼	·6	3 13 4¼
·65	1 10 3⅝	·65	2 5 1	·65	2 19 4	·65	3 13 7
·7	1 10 9¼	·7	2 5 4	·7	2 19 7	·7	3 13 10
·75	1 11 0⅜	·75	2 5 6¾	·75	2 19 9¾	·75	3 14 0¼
·8	1 11 4¼	·8	2 5 9½	·8	3 0 0½	·8	3 14 3½
·85	1 11 7⅜	·85	2 6 0½	·85	3 0 3½	·85	3 14 6½
·9	1 11 11	·9	2 6 3½	·9	3 0 6¼	·9	3 14 9¼
·95	1 12 2½	·95	2 6 6¼	·95	3 0 9¼	·95	3 15 0¼
10·0	1 12 0	13·0	2 6 9	16·0	3 1 0	19·0	3 15 3

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Editorial Notes.

New Agricultural Legislation.

The third session of the Twenty-second Queensland Parliament may well be regarded as a distinctly agricultural assembly. The measures foreshadowed in the Opening Speech of His Excellency the Governor (the Right Hon. Sir Matthew Nathan) are of much moment to the man on the land. The general tenor of the legislation proposed is in the direction of building up a higher and more complete rural civilisation. The programme includes such important measures as the Producers' Organisation Bill (now set down for the third reading), Fruit Cases Act Amendment Bill, Co-operative Agricultural Production Act Amendment Bill, State Advances Act Amendment Bill, a Bill to deal with the Dawson Valley Irrigation and Water Conservation Scheme, Agricultural Education Bill, Discharged Soldier Settlement Act Amendment Bill, Closer Settlement Act Amendment Bill, and a Forestry Bill.

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Primary Producers' Organisation Bill.

"It is recognised now that Agriculture, the mother of all wealth, is one of the most important industries, requiring not only a greater amount of energy, but a greater intelligence than any other calling." This dictum of the Minister for Agriculture (Hon. W. N. Gillies) in the course of his second-reading speech on the Primary Producers' Organisation Bill indicates the underlying principles of that important measure. The Bill, which has now reached the third reading stage, provides for the establishment of the Queensland Producers' Association, incorporates the Council of Agriculture and District Councils, and generally gives statutory sanction and power to the scheme for the complete organisation of the agricultural industry in Queensland. A full survey of its provisions will be published in the September Journal.

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Agricultural Education Bill.

Another measure of far-reaching importance to the agricultural industry has been introduced by the Minister for Education (Hon. John Huxham) in the form of a Bill to make better provision for agricultural education. No scheme for rural organisation would be complete without some provision for the extension of agricultural education. Current statistics set out in bold relief the national value of primary production. All our new wealth is derived from the soil. Agriculture calls for trained intelligence the same as any other vocation that demands an application of a combination of science and art. The Bill provides for the appointment of a board, upon which the Queensland University and agricultural educationists will be represented, and its purpose is to open up a new furrow in the field of agricultural knowledge for the benefit of children attending the State and rural schools. The board will have complete control of agricultural schools and agricultural classes.

* * * * * * * *

A Bill to Amend the Fruit Cases Act.

"The Bill is to give effect to the wishes of the fruitgrowers to make regulations for packing, grading, and standardisation of fruit." By this remark, in the course of his introduction of the measure, the Minister for Agriculture (Hon. W. N. Gillies) set out its object. The Bill is one of two clauses, and provides that no person shall (*a*) pack any fruit or vegetables intended for sale unless such fruit or vegetables is or are graded as prescribed by regulation; or (*b*) sell any fruit or vegetables in a package if such fruit or vegetables is not or are not graded as prescribed by regulation; or (*c*) sell the whole or any part of any lot of fruit or vegetables unless such lot of fruit or vegetables is stacked as prescribed by regulation; (*d*) sell any lot of fruit or vegetables if such fruit or vegetables is not or are not graded as prescribed by regulation.

Event and Comment.

Federal Guarantee for Cotton.

The Federal Government is taking a live interest in the development of the cotton-growing industry. The Commonwealth Cabinet has given consideration to the question of guaranteeing next season's cotton crop on the basis of £1 for £1 with the State Governments, on the understanding that the Empire Cotton Growing Association will co-operate. The amount of the guarantee, in detail, in connection with the Federal advance has not yet been decided. The Minister for Agriculture (Hon. W. N. Gillies) advises that the State Government guarantee has been extended to 31st July, 1923. The question of a further extension is now receiving Cabinet consideration.

Sugar Exhibits at the Brisbane Show.

The Australian Sugar Producers' Association intends to stage a comprehensive sugar exhibit at the forthcoming Show of the Royal National Association, opening at Brisbane on 7th August. A special feature will be a continuous band or frieze running along the top of the panels, containing, in large and clear texts, various facts and figures concerning the industry, so that he who strolls casually through the court may read and learn as he goes. The centre of the space will be filled by exhibits from the mills and refineries, showing the different processes of manufacture, and by industries allied to, or dependent on, sugar. An interesting feature will be a small hand crushing mill, by means of which there can be demonstrated to the public the actual analysis of juice from the sugar cane. A chemist will be in charge of this section, and short lectures will be given to visitors. The Royal National Association, evidently, and quite fittingly, intends to make exhibits of Queensland's most important agricultural industry one of the leading features of this year's Show.

Beerburrum Fruit—Returned Soldiers' Success.

A very fine collection of well-grown Beerburrum products, including pineapples, papaws, Seville oranges, passion fruit, and Lisbon lemons, was exhibited in the Office of the Minister for Lands recently. Commenting on the display, the Minister (Hon. J. Harry Coyne) remarked that the exhibit supplied effective evidence of the suitability of the land within the limits of the Beerburrum Soldiers' Settlement for profitable fruit production. The papaws were unusually large, and the pineapples weighed up to 7½ lb. each. One fine sample came from the farm of Mr. J. McG. Walker—an ex-service man 60 years of age. Mr. Walker also sent a number of large, clean-skinned Seville oranges, taken from 2-year-old trees. The pines displayed would go from nine to twelve to the case. The Beerburrum pine crop this year is expected to average about fifteen per case. Ordinarily a case holds about twenty. The Minister was particularly pleased with the excellence of the passion fruit exhibits, and regarded them as further disproof of the assertion that this fruit cannot be grown at Beerburrum. The whole display was indicative not only of the adaptability of the Soldiers' Settlement to fruit production but also of careful and correct cultivation.

The Bee-eater.

At a recent meeting of the Brisbane District Crows and Flying Foxes' Destruction Board, two members of the Queensland Beekeepers' Association, Messrs. Butler and Jones, addressed the assembly on the habits of the Bee-eater, or Rainbow Bird (*Meropsonatus*). Mr. Butler said that the birds would wait in trees near the hives, and when the bees flew past would dive at them and eat them. It was a severe trial for the beekeeper. Mr. W. F. Lyon, a notable beekeeper, had said that the bee-eater was a serious drawback to the industry. Mr. Jones said that he had had forty years' experience with bees, and he quoted a case where the contents of the stomach of one of these birds revealed four bees. He had never shot one of these bee-eaters without finding the sting of bees in the stomach. Mostly the bird kept a short way from the hives, but in wet weather, when the bees did not venture far out, the birds went right to the apiary. The question as to whether the Bird should continue to receive protection was discussed. Mr. A. H. Chisholm (State secretary of the Ornithologists' Union) spoke, by invitation. He said that the naturalists were not blind to the man on the land. The bee-eater's stronghold was Queensland, and was not so bad in the other States. The board decided to recommend that this bird should be removed from the protected list.

New Markets for Meat.

As the outcome of special inquiry, the belief is gaining ground that Australia will find an easement in the meat situation by cultivating a demand for her pastoral products in the populous countries in the North. They may be shipped either as frozen meat, boneless beef, tinned meats, or even to the nearer countries on the hoof, but it is felt that, in one form or another, there are big markets awaiting development practically at our door. Much information has been collected by the Graziers' Association, and this will facilitate final recommendations and decisions. Opinions as to the practicability of the proposal vary considerably, but, generally, the outlook is regarded as hopeful.

Already a fair beef trade exists between the North and North-west of Australia and Java, and this business is expanding. As Java has a population of 40,000,000 the possibilities there may not be overlooked. Japan is also a possible big customer. Already one shipment of 100 tons of frozen beef has been despatched to Japan to fill an army order, and the prospect of extending business to the civilian population seems fairly hopeful.

"The Chinese are a nation of meat-eaters, their purchases being limited only by their purses," is the remark of a Federal Government representative in a recent report. The meat hungriness of the Chinese Labour Corps was proverbial in France during the war, and was no little cause for anxiety to those who controlled the commissariat, particularly at rail-head dumps where Chinese were employed. China should provide ample room for an extension of the meat trade. Already the United States and Canada are fairly large shippers of meat to Shanghai and Hong Kong, and they are selling beef there at practically the same price at which it can be landed from Queensland to-day. America is evidently looking well ahead and is prepared to sacrifice present profits for future prospects, and Australia, apparently, must be prepared to do the same if our Northern markets are to be extended and permanetly established.

Defrosting Meat.

The Rayson-Cooper meat defrosting process has so impressed graziers that an effort is being made to secure Commonwealth control of it in the interests of the meat industry of Australia, and to this end the aid of the Queensland Government has been invoked. In the course of a recent statement on the subject the Premier (Hon. E. G. Theodore) expressed appreciation of the value of the representations made to him by the United Graziers' Association, and stated that, acting on their suggestion, he had communicated with the Federal Government on the matter. The Premier also referred to a report which he had received from the Agent-General (Hon. J. A. Fihelly) dealing with a demonstration, at which a representative of the Queensland Government was present, of the process in London. The demonstration was carried out at the British and Argentine Company's stores, West Smithfield. Veterinary experts were in attendance from the Australian and New Zealand High Commissioners' offices; also a representative of the Queensland Meat Export Company. The conditions observed were:—

(1) The meat was inspected and weighed before being placed in the defrosting chamber;

(2) The chamber was sealed after the meat was deposited;

(3) After removal from the defrosting chamber the meat was weighed under the observation or experts;

(4) The meat was held for a few days and joints were cut;

(5) Meat similar to that placed in the defrosting chamber was thawed out in the atmosphere and afterwards compared with that defrosted by the process.

The test was commenced on 20th March last, the meat used being Q.M.E. and Argentine beef and New Zealand and Argentine mutton and lamb. All the meat was carefully weighed at the time of removal, and the weights were compared.

It is set out that the mutton and lamb increased in weight, and there was a slight loss in the weights of some of the beef. All the meat was pronounced by experts to be thoroughly thawed and free from dripping, even when cut. On final examination from three to five days after removal from the chamber it was found to be sound and free from taint. It is stated by the promoters that the beef treated by the process had been sent to the shops of the British and Argentine Company and sold as chilled meat.

The Raw Cotton Situation.

"Cotton," the official journal of the Manchester Cotton Association, commenting on the raw cotton situation, early in June, remarks that the new crop continues to attract considerable attention, and there have been issued quite a number of forecasts of the condition of the crop, the principal one being that of the United States Government, which figured the condition of the crop on 25th May at 69.6, compared with 66.0 twelve months ago, and a ten-year average of 74.6. The National Ginners' estimate was 72.1. Reports indicated the invariable backwardness of the crop, which must make it more susceptible to boll weevil damage and later frost. In spite of these poor crop accounts, it is well to remember that the cotton plant has wonderful recuperative powers, and it is not unusual for the cotton crop to be proclaimed a disaster many times during the season. The Journal goes on to comment further:—

"Nothing fresh has developed in regard to the acreage prospects, and the average expectation, it is thought, would be for an increase of 10 per cent, for the belt as a whole. This would mean an area of a little over 35,000,000 acres on the revised estimate of last season, on which an average yield of 178 lb. lint to the acre would mean a crop of 13,000,000 bales, exclusive of linters. With a favourable growing season, better results may be realised, particularly as all reports indicate an abundant supply of labour for proper cultivation. In West Texas and around the rim of the belt from Texas to the Atlantic coast, the increase in acreage is said to be heavy.

"Trade reports continue encouraging, and consumers of raw cotton are displaying greater interest in the staple. This is no doubt due to their becoming more fully convinced regarding the seriousness of the supply position during the next year owing to the poor accounts of the new crop. Flooded lands have not yet been replanted and probably will not be. Recent weather has been propitious for the spread of the boll weevil, which is becoming increasingly active.

"The trade outlook fosters the belief that the mills will require an appreciably larger supply than the present season; thus a crop of even 13,000,000 bales would prove inadequate.

"It is believed that during the next year America will take at least 750,000 bales more, Great Britain 1,000,000 bales, and the Continent 750,000, in all 2,500,000 bales above the present year's figures of, say, 12,500,000, giving a total prospective consumption of 15,000,000 bales. This may be somewhat of an exaggeration, but there is no reason to doubt that the Continent will take an increasing quantity, and Great Britain, with improving trade, which country's imports are 1,500,000 bales behind this time last year, should take fully 1,000,000 bales more. As the surplus to be carried over at the end of this season is likely to be little above 4,000,000, consumers are realising more and more how precarious the supply position will become."

The Brisbane Show: Departmental Court.

As in former years one of the outstanding features of the Brisbane Show will be the Court of the Department of Agriculture and Stock. A special Cotton Trophy will illustrate every phase of the cotton industry. Other striking features will be exhibits of cereal types, propagation plots, indigenous grasses, sugar-cane, and wool. The work of the Entomological Division and Stock Institute will be well represented. The State Cannery will also stage an effective exhibit of its manufactured products. The colour scheme this year will be in grey and cream relieved with maroon. The trophy designs, plan, and general lay out of the Court are the work of Mr. H. W. Mobsby, F.R.S.A., the departmental photographer and artist.

Australian Fruit in England.

According to cable advices from London (25th July), Messrs. Freeman and Company, selling agents for the Commonwealth Fruit Pool, report that the market for canned fruits both Australian and Californian is very stagnant, owing to wet and unseasonable weather. Choice Australian pears realised up to 18s. 6d. per dozen, peaches to 14s. 9d. If the weather improves, the Australian fruit should do well, as the new Californian pack is a month later than usual. Pears will not arrive until early in October.

The "Grocers' Gazette" congratulates Australian packers on the immense improvement in their production and describes the fruit as of good quality, evenly graded, attractively labelled, and extremely well turned out.

A shipment of Australian oranges, brought by the Moreton Bay, including Queensland mandarins, turned out excellently.

American Prices—Staple Cottons.

An examination of recent American files shows that cotton prices are firm, with an upward tendency traceable to improved statistical situation and to modification of views relative to probable acreage. At the same time, in West Texas, and around the rim of the belt from Texas to the Atlantic coast, the increase in acreage is heavy, due to the idea that boll weevils will cause cotton prices to go much higher, while these sections are relatively free from weevils.

The menace of the flood in the Mississippi River, in so far as the delta below Memphis and the alluvial lands in Arkansas are concerned, is a thing of the past. The effect upon acreage, it is believed, will be slight, although production may be affected to some extent, for the reason that in many instances less fertile lands were substituted in the planting for the lands intended for cotton that were under water.

A View of the American Cotton Crop Outlook.

The "Textile World," of New York, states:—

"Several domestic cotton crops that were killed speculatively during May and June revived sufficiently later in the season to produce some of the largest yields the country has ever seen. A bulge in cotton prices, such as has been experienced in the last two weeks, may carry no conviction to spinners and distributors, and may actually discourage buying of the raw material and its products (as has been the case), but it is an opportune stimulant for growers. A 20 to 21 cent basis for middling upland cotton is sufficiently high to encourage growers to exert themselves to the utmost to get maximum production from the acreage planted and replanted.

"No irretrievable damage has been done by floods in the lower Mississippi valley or by heavy rains in Texas and Oklahoma. Comparatively little cotton land has been flooded, and the heavy precipitation in Texas and Oklahoma is likely to prove a blessing later on. Over the remainder of the cotton belt the weather has been generally favourable thus far. As to what it may be during the balance of the season one man's guess is as good as another's, but the important factor is that a sufficient acreage has been planted to give us one of the largest crops on record, and present prices are high enough to stimulate maximum effort and care in the cultivation of the growing crop.

"Adverse weather conditions are more to be feared by growers this season than is the boll weevil. In previous seasons growers in certain parts of the cotton belt have had reason to believe that they might escape the ravages of the boll weevil, but this year every grower started the season with the knowledge that he could not expect to make a crop unless every precaution was taken to fight this pest. By careful cleaning of the land before planting, by the planting of early maturing varieties of cotton, by the increased use of fertilisers, by careful cultivation, and by the utilisation of chemical and other methods of destroying the insect and its larvæ, this season's cotton crop will be the first general demonstration of the grower's ability to check the ravages of this pest. It is confidently to be expected that real progress will be shown, and that the percentage of the crop lost from this cause will be considerably less than it was last season.

"There is another phase of the recent radical advance in cotton prices that we would like to overlook, because of the discouraging effect that its exploitation might have upon growers, but it must be recognised sooner or later. We refer to the fact that maintenance of current cotton prices must result in a marked restriction of consumption. Even when cotton was selling well below 18 cents demand for cotton manufactures from Asia, Africa, and other so called cheap markets remained considerably below pre-war volume. Every cent of advance above an 18 or 20 cent basis for middling uplands must involve a further marked restriction in demand from countries of low purchasing power, including the impoverished countries of Europe. It is true that, at current prices, cotton is not selling much above the average basis of commodity prices, which in foreign markets are about 65 per cent. above the pre-war average; yet, to insure anything like maximum pre-war consumption, cotton must be available well below the average commodity level, and that means a maximum of about 18 cents. At that price fair profits for both growers and spinners would be possible, and probably a 12,000,000-bale American crop might be absorbed.

"The fair conclusion to be drawn from these apparently conflicting statements is that spinners cannot hope to operate their machinery at anywhere near maximum capacity unless they can produce goods at prices that can be paid by the inhabitants of countries of low purchasing power, and such prices are not possible unless growers are able to provide an adequate supply of cotton at proportional prices. It means hard work and narrow profits for growers, spinners, and their employees, until such time as world prosperity and buying power are more nearly normal."

Boll Weevil and Overflows.

In reply to an inquiry regarding the effects of floods on the boll weevil, W. D. Hunter, of the United States Government Bureau of Entomology, writes a Southern planter as follows:—

"We have never found a case where extensive overflows have reduced the weevil to the extent that the crop has been greatly benefited. It is true that some weevils are always killed by overflows, but there are survivors in the trees and on the high lands immediately surrounding the overflowed areas. When these areas are replanted the crop is late; in fact, so late that the weevils left are able to overtake the production of fruit."

Next Year's Cotton Consumption.

A correspondent, writing in "Commerce and Finance," New York, states:—

"No matter how large the crop may prove to be, basing calculations on experience, we believe consumption will be far in excess of production.

"When we analyse supply, we consider both the visible and invisible items. With demand, we are prone to pay attention only to the visible, or momentarily tangible aspects of demand. At present we are likely to be swayed too much by slack inquiry for raw material and goods. We overlook factors of far more compelling import—depleted shelves, low inventories among industrial users of cotton fabrics, scanty wardrobes among the fairly well-to-do, and the rags and tatters to which millions of the world's population have been reduced in the last few years. This is the source of the invisible demand. The need is there, urgent and desperate in many cases, requiring only an increment in buying power to render it astonishingly effective. That it will become thus effective, only those who fail to read the signs of the times will doubt.

"While we make no positive prediction, we believe the basis has been laid for a consumption of American cotton for the season of 1922-23 of fully 15,000,000 bales if that supply can be obtained, and unless prices rise practically to a prohibitive point.

"Consumption of American cotton for the year ending 31st July, 1922, we believe will be approximately 12,500,000 bales. In view of the fact that the textile industry of the United States this season has been recovering from depression, with operations retarded by strikes and curtailment, and in view of the indicated improvement in general business, we expect American mills in the season beginning 1st August, 1922, to increase their consumption by at least 750,000 bales.

"We expect British consumption of American cotton to increase by a minimum of 1,000,000 bales. Lancashire, through its recent wage reductions, has placed itself on a competitive basis. Great Britain is not going to permit the extinction of her great textile industry. This season's statistics furnish no guide to the future. According to the 'Financial Chronicle,' exports to Great Britain up to the close of last week were only 1,297,000 bales. This compares with 2,824,000 bales for the corresponding date in 1920. They indicate total exports of less than 1,800,000 bales. The amazing significance of these figures may be appreciated when we find that we have to go back to 1874, nearly half a century, to find British imports on approximately the same scale. The United Kingdom took more than 2,000,000 bales as far back as 1858. We therefore consider the estimate of 1,000,000 bales increase extremely conservative.

"The continent in our opinion, will increase by fully 750,000 bales of American cotton. Italy, according to our advices, is preparing to increase at the rate of 20,000 bales per month. Germany, Poland, and Czecho-Slovakia will be working on a much larger scale. France has by no means reached her limit. The figures on Japan and China we leave unchanged. Any deficit from this quarter is likely to be made up by additions for other countries.

"This makes a total addition of 2,500,000 bales to the probable consumption of 12,500,000 bales this season, or a prospective absorption of 15,000,000 bales. According to the Census Bureau, the total carry over of American cotton in all positions throughout the world last season was 9,172,000 bales. The crop of last season was about 7,800,000 bales, making an aggregate of 16,972,000. This season's consumption of 12,500,000 bales would reduce the total surplus to less than 4,500,000 bales. A crop of 12,000,000 bales for the new season would give a total supply for 1922-23 of about 16,500,000 bales to meet an indicated demand for 15,000,000 bales. This would be nearer to famine than the cotton world has been since Civil War days. If the crop should be less than 12,000,000, the effect of the resultant stringency would be indescribable."

Recapitulation of Cotton Exports from the United States for 100 Years.

The subjoined table indicates a century's progress, decade by decade, and the enormous value of the cotton industry to the United States. Incidentally the figures open out a new vista of agricultural development and possibilities in Queensland.

Decade.	Bales.	Tons.	Value.
			$
1821-1830 ..	4,071,687 ..	1,017,923 ..	256,632,567
1831-1840 ..	8,634,662 ..	2,158,667 ..	528,789,702
1841-1850 ..	13,989,587 ..	3,497,398 ..	553,427,062
1851-1860 ..	23,601,577 ..	5,900,395 ..	1,146,092,778
1861-1870 ..	8,089,101 ..	2,022,258 ..	1,083,373,097
1871-1880 ..	28,420,585 ..	7,105,148 ..	1,945,673,249
1881-1890 ..	42,642,888 ..	10,660,724 ..	2,206,812,580
1891-1900 ..	60,837,298 ..	15,209,327 ..	2,256,455,584
1901-1910 ..	74,733,416 ..	18,683,356 ..	3,859,233,593
1911-1920 ..	76,190,467 ..	19,017,620 ..	6,512,761,108
Grand total ..	341,211,268 ..	85,212,816 ..	20,349,251,320

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE 1922, AND 1921, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. June.	Average Rainfall. No. of Years' Records.	Total Rainfall. June, 1922.	Total Rainfall. June, 1921.
North Coast.	In.		In.	In.
Atherton	1·59	21	1·31	2·95
Cairns	2·86	40	2·71	8·12
Cardwell	2·07	50	1·50	2·77
Cooktown	2·01	46	1·48	4·13
Herberton	1·01	35	0·94	2·68
Ingham	2·46	30	1·75	4·94
Innisfail	7·04	41	9·37	10·25
Mossman	2·39	14	1·58	6·41
Townsville	1·27	51	0·19	0·58
Central Coast.				
Ayr	1·30	35	0·73	0·36
Bowen	1·61	51	0·50	0·69
Charters Towers ...	1·33	40	0·30	0·33
Mackay	2·71	51	1·34	2·93
Proserpine	3·49	19	1·26	6·18
St. Lawrence ...	2·46	51	1·46	2·90
South Coast.				
Biggenden	1·86	23	2·38	3·93
Bundaberg	2·72	39	1·57	4·48
Brisbane	2·64	71	1·83	7·98
Childers	2·20	27	2·33	3·86
Crohamhurst ..	4·09	30	1·81	11·05
Esk	2·06	35	1·24	6·29
Gayndah . . .	1·87	51	1·36	6·56
Gympie	2·51	52	3·13	5·57
Glasshouse M'tains	4·10	14	1·66	11·15
Kilkivan	2·07	43	1·28	9·03
Maryborough ...	2·81	51	2·80	3·89
South Coast— continued:				
Nambour	3·42	26	2·02	8·59
Nanango	2·05	40	1·47	7·68
Rockhampton ...	2·07	35	1·82	7·07
Woodford	2·67	35	2·23	8·36
Darling Downs.				
Dalby	1·68	52	2·55	5·57
Emu Vale	1·44	26	1·55	4·75
Jimbour	1·71	34	2·45	7·03
Miles	1·92	37	2·04	4·28
Stanthorpe	1·89	49	1·49	5·81
Toowoomba .	2·37	50	1·61	6·56
Warwick	1·80	57	2·08	5·54
Maranoa.				
Roma	1·68	48	3·27	3·80
State Farms, &c.				
Bungeworgorai ...	1·67	8	2·58	3·76
Gatton College ...	1·75	23	1·03	6·08
Gindie	1·55	23	1·10	3·97
Hermitage .	1·96	16	2·10	5·17
Kairi	1·25	8	Nil	4·45
Sugar Experiment Station, Mackay	2·37	25	0·91	3·00
Warren	1·90	8	Nil	7·17

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

Production, Prospects, and Prices.

The following market survey is an abridgement of departmental summaries of conditions, prospects, and prices for the monthly period ended 28th July, 1922:—

Agriculture.

General rain at intervals in the course of the period was most opportune, and altered completely the whole outlook, more particularly as concerns wheat. Seasonal conditions prevailed and sharp frosts were recorded in most areas. Winter crops are well forward, but the season is too far advanced to permit of some fodder classes (particularly root crops) benefiting by the altered conditions. A continuance of normal factors will mean, probably, an excess of the 1922 wheat crop over last year's harvest.

Cotton is receiving marked attention in every agricultural area, and the 1922-23 crop promises to be a record since the revival of cotton culture within this State.

Arrowroot production for milling purposes has been influenced adversely by last year's slump in prices.

Preparation for potato-planting are well forward in localities where early planting is usually practised, but continued low temperatures may influence growers who usually prefer July planting in deferring operations.

Towards the end of the term wheatgrowing prospects improved greatly and in many localities there was a sufficiency of sub-surface moisture to carry cereals on to the advanced stages of growth.

Lucerne Chaff.—As the term advanced supplies increased and prices receded; 9s. 6d. for prime was the top and 4s. for inferior was the minimum for the month.

Oaten Chaff.—4s. 4d. to 9s. 6d. was the month's range. Supplies were moderate and trans-border consignments light.

Mixed Chaff.—5s. 6d. to 8s. 4d. were the extremes for the month. Supplies and demand moderate.

Maize.—Prime grain values to 4s. 4½d. early in the term. The following week showed a slight advance, prime bringing 4s. 5½d. In the third week quantities increased and sales were made at from 4s. 2d. to 4s. 6¾d. Last week grain was plentiful, demand fair; sales to 4s. 8½d. Other lines held 4s. 5d. to 4s. 7½d.

Potatoes.—Sales were effected at 4s. to 7s. early in the month. Light to moderate quantities came to hand later and business was done at 4s. to 7s. 11d. Some lines were held at 4s. to 8s. 6d. In the third week clearances were made at from 4s. to 7s. 9d.; new realised 9s. Last week demand eased; sales from 5s. to 8s.

Sweet Potatoes.—Supplies moderate early in the period—4s. 6d. to 5s. 6d. Second week, light supplies—3s. to 4s. 9d. These conditions continued up to last week when sales were made at 2s. 6d. to 5s. 1d.

Pumpkins.—Last week supplies were fair; sales from 4s. to 5s.

Broom Millet.—At the end of the month sales were made at from £50 to £60 per ton.

Fat Stock.

Review of fat stock market during the week ended 28th July:—

Cattle.—980 yarded, mostly bullocks, from fair to prime. The market opened very firm, with values higher than preceding week's figures. Prime from 22s. to 25s. per 100 lb. Later, values eased. Prime bullock beef averaged 22s. 6d., medium and good trade beef, 20s.; best cows were worth generally from 15s. to 17s.

Sheep.—6,655 offered. Yarding, mixed. Commencement values firm and hardened as market progressed. Demand brisk for all descriptions. Prime mutton, 5d. to 5½d.; medium and good trade mutton realised to 5d., in addition to skin value.

Pigs.—Marburg Sales, 29th July.—230 pigs were yarded, and baconers made 7d. lb. throughout, and were eagerly sought after. Prices paid were:—Backfatters, £4 5s. to £6 2s.; baconers, heavy, £3 10s. to £3 19s. 6d.; medium, 60s. to 69s. 6d.; light, 48s. to 59s. 6d.; porkers, 40s. to 50s.; stores, 15s. to 30s.; slips, 6s. to 12s. 6d.

Fruit and Vegetables.

A system of obtaining absolutely accurate market information is being devised and prices to the grower will, it is hoped, be published in the next Journal and thereafter.

General Notes.

Guarantee to Cotton-growers.

It is said that some prospective cotton-growers are hesitating, not feeling certain about the duration of the time during which the Government guarantee of 5½d. per lb. for the crop will hold good. The Minister for Agriculture (Hon. W. N. Gillies) has stated that it will hold good until 31st July, 1923.

Publication Received.

We have received from the Director of the Dominion Experimental Farms and Stations, Ottawa, Canada, "Seasonable Hints," a very interesting publication, from which we have taken two articles which give good advice to Canadian farmers, and which apply to the man on the land in our own State.

Destroying Ants.

We frequently are asked to give some remedy for the destruction of black ants, and only recently we published several proved remedies. As a present inquirer may not have seen these, let him try the gasoline cure. Pour a half-pint of gasoline into the ant hill or nest of the pests. This will instantly spread through all the nest or hill when it is set on fire; and as the heat on the surface increases, the gas will generate from the utmost recesses, and the fire will cook the ants. The amount of gasoline stated will burn for a long time, and kill every ant in the largest nest as well as all which attempt to enter it from without.

Manufacture of Motor Spirit.

For some time past the Bundaberg Distillery Company has been experimenting with power alcohol as a means of utilising instead of destroying the immense quantities of molasses produced, and which cannot be conserved in the manufacture of rum. Mr. W. R. Hartnell (chairman of directors) has succeeded in manufacturing power alcohol on a commercial scale, and maintains that the product can be marketed to car-owners at 1s. per gallon less than petrol. The spirit, it is stated, can be used in any car without alteration to existing equipment, and on recent trials on cars used in connection with the Prime Minister's visit to Bundaberg gave within 5 per cent. of the mileage obtained by the use of petrol.

Queensland Agricultural College Bursaries.

An examination will be held on the 9th and 10th November next, in Brisbane and elsewhere, according to where the candidates reside, for four bursaries at the Queensland Agricultural College, tenable for three years. Candidates must not be less than 16 or more than 18 years of age on the 1st January, 1923. Candidates failing to obtain a bursary, but who pass this examination, will be considered to have passed the College entrance examination, and may enter the course for the Diploma in Agriculture on payment of the College fees. Nominations close on the 25th October, 1922. Further particulars can be obtained upon application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The Boll Weevil.

The statement issued by the United States Department of Agriculture referring to boll weevil has attracted considerable attention. A correspondent states that according to this statement an unprecedently heavy infestation of weevil is likely this year, and farmers are advised to limit their acreage to areas which can be thoroughly cultivated. It appears that this statement regarding the weevil outlook is based upon the result of tests conducted in the Government experimental station at Tullulah, Louisiana, where the insects are kept under observation during the winter and their condition noted after freezing weather has passed. These tests, it seems, showed that five times as many weevils as usual survived hibernation, but the question is whether tests conducted in this particular locality can be considered representative of the entire belt.

Many cotton men believe that the winter mortality of the insect may have been much greater in more northerly sections, and there has been considerable criticism of the official statement as tending to support propaganda for a restricted area or against any greatly increased acreage.—"Cotton."

Forestry Legislation and Education.

The projected Forestry Bill and the matter of stimulating education and research in forestry were the chief subjects discussed at the last meeting of the Empire Forestry Association, at which His Excellency the Governor, Sir Matthew Nathan, presided.

Consideration of the status of forestry legislation in Queensland, deferred from a previous meeting, was to have been resumed. It was reported, however, that the Minister for Lands, Mr. Coyne, had given an assurance that a Forestry Bill would, in all probability, be introduced during the present session, and that a skeleton draft of the measure would be submitted to the association with the view to practical suggestions being offered.

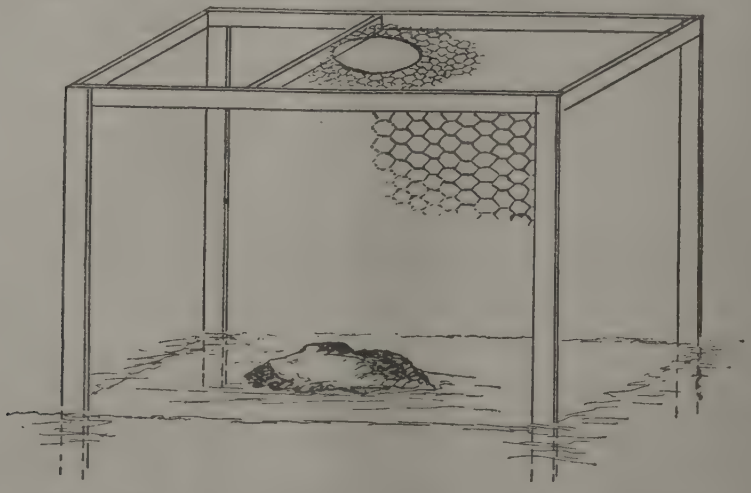
The meeting accordingly turned to the question of education and research which was introduced by Mr. Henry Tryon, chief of the Division of Entomology, Department of Agriculture and Stock. After Mr. Tryon had emphasised the importance of cultivating a knowledge and appreciation of trees among school children and at the University, the following subcommittee was appointed to consider and report upon the subject:—

Messrs. E. H. F. Swain and C. R. Paterson (Forestry Department); Professor Hawken and Dr. Bagster (Queensland University); Messrs. R. A. Wearne and L. C. Morris (Technical College); C. Thompson (Teachers' Training College); Miss F. Bage (secondary school); Messrs. J. C. Stubbin (primary schools); W. J. Doak (Railway Department); F. O. Nixon (Timber Merchants' Association); C. T. White and H. Tryon (Agricultural Department); and Dr. H. I. Jensen (Geological Department).

In the discussion bearing upon the subject special reference was made to the value of Arbor Day in the schools, and Mr. A. E. Kennedy (Under Secretary for Education), assured the meeting of the continued cordial support of his department in this direction.

An Effective Crow Trap.

Mr. W. G. Brown, State Sheep and Wool Expert, supplies the following particulars of an effective crow trap:—One of the best traps for crows I have seen is that figured below.



As will be seen it is a rectangular frame covered with wire netting on top, bottom, and sides. On the top a circular space is left free from netting alongside a cross bar on which the crow alights. The bait, any carrion will do, is laid on the earth below the opening. The crow alights on the bar and drops through the aperture on to the bait. When surfeited, he naturally attempts to fly out, but the spread of his wings effectually prevents his escape. With this trap I have seen as many as twenty crows captured in one day. When one crow is caught he attracts others. The specifications are—Size of framework: 6 feet x 4 feet x 6 feet. The uprights should be let into the ground to a depth of about 1 foot. The aperture should be about 20 inches in diameter.

The Public Curator.

The Public Curator, whose advertisement appears in this paper, makes up wills free of any charge, when a testator or testatrix desires to appoint him trustee and executor. It is noteworthy that he has special powers under his Act, which enable him to provide for the maintenance, education, and general up-bringing of infant beneficiaries; legal advice and assistance are also given free, and all matters dealt with by him are strictly private. All trust funds in his hands belong to the beneficiaries for whom he is trustee and not to the Government, though the Government is behind him to protect the public if he commit a breach of trust. His accounts are under the supervision of the Auditor-General, and he is also directly responsible to the Supreme Court for his trusteeship. The Public Curator will be glad to give information to any one seeking it.

Interstate Fruit Specials.

Fruit trains ran on behalf of the Southern Queensland Fruit Growers' Society, Ltd., cleared Wallangarra on Friday and Saturday for the week ended 15th July, carrying 304¾ tons, of which 193½ tons were for Melbourne and 111¼ tons were for Sydney, consisting of 5,280 cases of bananas, 1,956 cases of pines, 355 cases of citrus, 11 cases of passion fruit, 70 cases of custard apples, 19 cases of papaws, 3 bags of peanuts,, and 34 bags of beans. Melbourne took 3,714 cases of bananas, 814 cases of pines, 351 cases of citrus, 4 cases of passion fruit, 1 case of custard apples, 3 cases of papaws, and 3 bags of peanuts. Sydney took 1,566 cases of bananas, 1,142 cases of pines, 16 cases of papaws, 7 cases of passion fruit, 68 cases of custard apples, and 34 bags of beans. District loadings by tonnage were:—Dayboro' line—to Melbourne, 25 tons; North Coast—to Sydney, 51¾, to Melbourne, 153; Tweed Heads—to Sydney, 49; Currumbin—to Sydney, 10¾, to Melbourne, 15¼.

Arsenic as a Cotton Pest Killer.

Thus the "Queensland Government Mining Journal"—

The "Engineering and Mining Journal-Press," of New York, in its issue of 20th May, 1922, gives prominence to the uses of arsenic in the cultivation of cotton, particularly in fighting the cotton boll weevil, a pest which, fortunately, we are not at present troubled with in Queensland. Through Government research calcium arsenate has been found effective, when properly applied, against the boll weevil, and as the encroachment of the boll weevil has encompassed the entire cotton-producing section of the United States at this time, the demand for and use of calcium arsenate will be greatly increased. The basic purpose of the poisoning is to merely keep the weevils sufficiently reduced in number so that their feeding will not increase the fruit shed which would be experienced in their absence; that is to say, the weevils are allowed to develop undisturbed until they approach the point of actually reducing the crop, and are then held in check by poisoning just long enough to let the plant set and develop beyond weevil injury all bolls that it will be able to mature.

If calcium arsenate is properly made it will not injure the cotton plants, nor is it nearly so dangerous as paris green, as it does not possess the caustic characteristics of the latter. When properly applied from 5 to 7 lb. of calcium arsenate are required to an acre for each application, the number of applications usually varying from three to five, with an interval or from four to seven days between applications, depending upon the extent of the infestation and atmospheric conditions. Owing to the cost of the material and applying, the Government states that it seems inadvisable to attempt poisoning of land which is not capable of making at least one-half bale of cotton per acre in the absence of weevil injury. The gain secured by poisoning ranges as high as 1,000 lb. of seed cotton per acre, and on fairly fertile soil, subject to a serious degree of weevil injury, average gains of from 300 to 500 lb. of seed cotton per acre are entirely possible.

There seems to be no method of determining an average amount of arsenic used in the manufacture of calcium arsenate, owing to seasonal demands varying in accordance with agricultural conditions; that is to say, with low prices for cotton, comparatively little boll-weevil poisoning would be undertaken by the planters, whereas with good prices for cotton, and the consequent necessity of saving the crop, there would be a demand for a large amount of calcium arsenate. The quantity of calcium arsenate used per acre will vary from 15 to 25 lb., according to the number of applications required; and, if the use of calcium arsenate became at all general throughout the cotton-producing area, it would afford a market for practically all of the arsenic produced in the United States.

The principal difficulty at the present time is in securing an effective method of application. Calcium arsenate is used in exceedingly fine powdered form, and is applied either by machines treating five rows of cotton at a time, or by means of a hand gun, usually carried by a man on horseback, treating one row at a time.

Answer to Correspondent.

Cockroaches and their Extermination.

V.F.S. (Woombye)—

Mr. Henry Tryon, Entomologist-in-Chief, supplies the following information in answer to your query:—

Houses about Brisbane are subject to infestation to a greater or less extent by different kinds of these pests. In fact, there are about at least six distinct species to be met with in Brisbane tenements alone. Any satisfactory reply to it cannot therefore be given without knowing in the first place which one is at present in any instance of infestation, such as the one at Glen Vale referred to.

This is due to the fact, not only that their habits are different, but rather that what one cockroach will consume individuals of another kind will not touch. This remark in fact especially applies to the small so-called "German cockroach" that will not take baits that contain arsenic (whilst one or more of the larger kinds are very partial to it) or only be made with difficulty to allow this poison to enter into their systems. There are several cockroach proprietary specifics sold by chemists and duggists.

The small cockroach mentioned, and a second cockroach the same size is, however, killed by powdered borax. Further, there is a very useful phosphorus bait, understood to contain sweetened flour paste impregnated with this body, after just dissolving it in carbon bisulphide; but the latter solution, being inflammable, it is preferable to try the mixture already made and placed in special containers. This paste, when employed, is simply thinly spread on pieces of paper or cardboard, that when so treated are placed in the haunts of the cockroaches, whose destruction is aimed at.

In rooms, or houses containing rooms, that can be completely closed against the egress of vapours, the insect may be killed by fumigating with sulphur fumes, pyrethrum (or insectibane) fumes, hydrocyanic acid fumes, and by others of their kinds. Two or three hours submission to their action is generally all that is required. However, a second fumigation is necessary when a few weeks have elapsed since the first was executed to admit of the eggs hatching out, since these bodies themselves can with difficulty be assailed when placed side by side in the peculiar cockroach egg cases.

Cockroaches may again be trapped in large numbers. The traps made for this purpose, however, greatly vary. A simple one is composed of a single wooden box in the cover of which is a round hole into which the neck of a wide mouth bottle just fits. This box is just baited with some food substance to which cockroaches are very partial (sweetened stale beer in the case of one kind of cockroach) and then placed in their haunts as night is coming on.

Note.—I find that amongst cockroach poisons stocked by chemists here are—Paris green, blatticide, scatter, roach, and borax, the merits of all of which are equally extolled.

SHOW DATES 1922 AND 1923.

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Belmont: 19th August.
Horticultural Society of Queensland (Annual): 19th August.
Coorparoo: 26th August.
Kenilworth: 31st August.

Beenleigh: 1st and 2nd September.
Zillmere: 1st and 2nd September.
Gympie: 7th, 8th, and 9th September.
Wynnum: 9th September.

Imbil: 13th and 14th September.
Laidley: 13th and 14th September.
Sherwood: 16th September.
Rocklea: 23rd September.
Kilcoy: 28th and 29th September.

Esk Camp Drafting: 4th and 5th October.
Pomona, 4th and 5th October.
Southport: 6th October.
Enoggera: 7th October.

WARWICK.—Eastern Downs Horticultural and Agricultural Association: 13th, 14th, and 15th February, 1923.

FRUIT FLY INVESTIGATIONS.

[FOURTH PROGRESS REPORT.]

By HUBERT JARVIS, Entomologist in Charge of Fruit Fly Investigations at Stanthorpe.

Early in February of this year Mr. Hubert Jarvis, of the Division of Entomology, Department of Agriculture and Stock, was appointed to investigate the Fruit Fly Problem in the Granite Belt. The first report of his observations and activities was published in the May Journal. The second and third reports appeared in June and July, respectively, and the following report is now made available by the Minister for Agriculture and Stock (Hon. W. N. Gillies).

[LETTER OF TRANSMITTAL.]

Sir,—I have the honour to submit, and at the same time to recommend for publication, the Fourth Progress Report by Mr. H. Jarvis, Entomologist in charge of Fruit Fly Investigations, Stanthorpe, premising that the portion "Seasonal Absence of Fruit Fly," and dealing with a special investigation into the possible occurrence of the insect in the northern districts of New South Wales, abutting on the Stanthorpe area, has already been made the subject of a separate document, giving more detail, dated 14th July, 1922. It is further to be added, in reference to the section "Cold Storage and Fruit Fly," that whilst the report emphasises the value of this operation for the purposes set forth, it obviously ventures no opinion on the general adaptability of Stanthorpe fruit for continuous submission to the process, nor on the admissability of the latter as an economic procedure—questions that are not, primarily, entomological ones.

I have, &c.,

HENRY TRYON, *Entomologist-in-Chief.*

Wintering of Fruit Fly.

Although, possibly, fruit-fly maggots may still be found present in stored fruits, those which have been under observation in the laboratory since 23rd June, 1922 (on Ben Davis apples), have now all perished, presumably owing to very low temperatures experienced during the last few weeks. One specimen of *B. Tryoni* (Queensland Fruit Fly) emerged in this Office on 20th June, 1922, from larvæ collected on 23rd March, 1922, on quinces. This fly, however, was very much crippled, and died soon after emergence.

Adult fruit flies have been kept alive in glass jars in the laboratory for nine weeks. None originally collected are, however, alive to date.

Search has been made in packing-sheds and other suitable situations with a view to the possibility of finding the fruit fly (*B. Tryoni*) hibernating as a mature insect, but no specimens have so far been met with.

Fruit fly pupæ, apparently alive, are still under observation in this Office.

Seasonal Absence of Fruit Fly.

Consequent on reports that abandoned and neglected orchards existed in New South Wales, adjacent to the Queensland border, arrangements were made by the Queensland Agricultural Department to investigate the question, the Department of Agriculture of that State co-operating with it and deputing their Government Entomologist-in-Chief, Mr. W. W. Froggatt, F.L.S., to assist in the undertaking.

Mr. Froggatt accordingly arrived at Stanthorpe on 28th June, 1922, and in his company the following places were visited:—Marylands Station and district, Wylie's Creek, Liston, Undercliff, Wilson's Downfall, Rivertree district, Wallangarra, Tenterfield, and Boonoo Boonoo. In most of the above districts abandoned and neglected orchards were noted, and visits of inspection made (*vide* report, 14th July, 1922). On the first day of inspection the party was accompanied by Mr. W. Ranger, President, Southern Queensland Fruit Growers' Association, and he took a very keen interest in the investigation and in viewing these neglected orchards first hand, so to speak, but owing to his many engagements he was, unfortunately, unable to make one of the party on its inspections subsequently.

The possibility of the existence of the fruit fly (*B. Tryoni*) in the maggot or other stage at the present time of the year, outside the Stanthorpe area and at a

lower altitude, was also made a subject of investigation, and in pursuance of this object a vine scrub, situated on the Warwick road, about 25 to 30 miles from Stanthorpe, was visited, as also was Patterson's Scrub, lying, at a similar distance north of Stanthorpe, in New South Wales.

Both Patterson's Scrub and the vine scrub already mentioned are likely, in season, to produce and harbour native fruits suitable for the local development of fruit fly maggots; and, negative evidence of such occurrence being alone forthcoming, it is proposed to again visit them during, say, next October.

The close proximity of many of the neglected and abandoned orchards inspected in New South Wales to the Stanthorpe district (in some cases distant not more than 10 miles—*e.g.*, Marylands, Liston, and Wylie's Creek), would, in my opinion, probably result in their proving a source of fruit-fly infestation to the Granite Belt area of Queensland. Fruits such as plum, peach, and apple maturing, as they do in the above districts, somewhat earlier than similar fruits in the Granite Belt, it is quite possible that fruit flies developing from maggots in these fruits over the border might easily find their way (aided, it may be, by favouring winds) into the Stanthorpe area. In order to ascertain if this be the case, it is my intention to carry out experiments in this direction early in the coming season. Large numbers of fruit flies can be bred in the insectary, if then available, and after being suitably marked, can be transferred to varying distances and liberated, the range being extended as results, ascertained by recaptures, dictate.

[*Note.*—We are indebted to Dr. Spencer Roberts, of Stanthorpe, for bringing to our notice the vine scrub referred to above; and, moreover, for the very material help he afforded us, too, throughout the investigation.]

Cold Storage and Fruit Fly.

While on leave of absence in Brisbane, a letter was received from Mr. A. H. Paget, The Summit, requesting the examination of a case of apples (variety, Ben Davis) then in cold storage, and which had been already submitted to a temperature of 38 deg. Fahr. for a period of seven weeks. Being at the time unable to attend to the matter myself, Mr. H. Tryon, Government Entomologist and Pathologist, kindly made an examination of them for me, and reported as follows:—

(1) It was possible to detect in those apples examined that they had been punctured by fruit fly, but these punctures were so inconspicuous not to compel the attention of the ordinary buyer of fruit.

[*Note.*—Four apples in the top layer of the case exhibited more or less decay. In three of these, case injury had operated, and the remaining one exhibited *bitter rot.*]

(2) Connected with the punctures were slender tunnelings—sometimes branched, extending inwards from four-tenths to seven-tenths of an inch, rarely to one inch. These were obvious since their walls had become brown (chemical change), and not because they had proved sites of decay, since this decay, which ordinarily happens with fruit-fly attack, was absent. In fact, the injuries remarked had to be looked for rather than being obvious, and were scarcely material.

(3) No fruit-fly eggs were discoverable, and wherever fly maggots occurred these were quite small, and had evidently not been long hatched.

(4) Every maggot was found dead and shrunken; the fact of death being very evident owing to the dark colour acquired. Their small size points to very brief duration as living maggots, on once being submitted to cold storage conditions.

(5) Except those fruit abovementioned as decayed, to a greater extent the fruit had kept all right. As packed, it was sound and marketable.

Mr. Tryon further added—

"This last statement as to condition of fruit is the pronouncement of the Director of Fruit Culture, Mr. A. H. Benson, who concurs with me, and I in concluding also that bitter pit was present in several of the apples, may have become more noticeable during the period of storage; and, as consequence of it, others have testified also as to the soundness and lack of evident injury of the apples in question.

"It may be concluded from this examination that apples of the kind represented in the experiment may remain free from fruit-fly attack, almost up to the time that they are ready for being harvested; that fruit-fly maggots (and eggs) present in them can be killed, on their having been gathered, by submission of the apples to cold storage; and that the amount of injury developed be dependent, in any one apple variety, on the time elapsing between gathering and submission to this process."

The foregoing statement, testifying as it does to the efficacy of cold storage conditions in destroying the eggs and young maggots of the fruit fly before material damage has been effected, and also to the consequent soundness and marketable quality of the fruit subjected to them, should undoubtedly prove of very great value to all who are interested in this important question.

Supposed Fruit-Fly Maggots.

Maggots about half grown and bearing a rather close general resemblance to those of the fruit fly (*B. Tryoni*) were recently submitted to this Office by Mr. B. Wilson, of Cotton Vale. These maggots had been discovered in cow dung under the following circumstances:—Large quantities of maggot-infested apples had been, it was stated, fed to the cattle yielding this excrement, and this saved, with intention, presumably, of examination for indication of the possible presence of living fruit-fly larvæ or pupæ therein. On being examined in this Office the maggots in question proved to be those of one of our common muscid flies (Fam. *Anthomyidæ*) and not, as was supposed, the maggot of the Queensland Fruit Fly (*B. Tryoni*).

Another instance of maggots similarly mistaken for those of the fruit fly was supplied by specimens tendered by Mr. D. Taggart, of The Summit. These maggots were found in rotting apples that had been missed in the harvesting and were lying under the orchard trees; these apples, moreover, had been subjected to a good many very severe frosts, but in spite of this the maggots which they contained were still alive and active. The situation in which the insects were found, and their general colour and size, led, as might be naturally expected, to their being mistaken for fruit-fly maggots. On examination, however, they proved to be the interesting maggot form of one of the large family of flies known as the *Syrphidæ*. Certain species of flies of this group breed only in vegetable matter reduced to a semi-liquid or liquid state through decay, and so are not responsible for any injury to fruit or vegetables. Other syrphid flies, again, are in many instances the good friends of the orchardist, feeding, as certain species do, on aphides or plant lice.

Red Mite.

Red Mite (*Bryobia* sp.) is in the egg stage very noticeable in many orchards at the present time. Trees harbouring their eggs look as if they had been painted with bands of pink and light-red colour. A portion of this encrusting matter, on being examined with a lense, will be seen to be composed of large quantities of minute ova. These eggs (about ¼ mm. in diameter) are laid adjacent to one another, on the trunk and lower branches of the tree, any wrinkles in the bark being generally filled with them. Not only are they thus laid on the bark of the tree, but also on and within the ground at the base of it, and so, on turning over the small lumps of soil here, hundreds of these eggs will be seen covering the under surfaces and packed away in every crevice between and within them.

Although not credited with doing very much harm, it is extremely probable that, should these mites multiply unchecked, their attacks would have a very injurious effect on the host tree. The usual winter spraying, practised by most orchardists here, should prove effective in destroying the eggs of this mite, where present; or, rather, the young on issuing from them. Miscible oil sprays might be used against them with success also.

Concluding Remarks.

As will be seen from the foregoing report, much of the period embraced therein has been occupied by investigations away from Stanthorpe and by the annual leave.

It is hoped that before the fruit season opens the station here will have been equipped with a suitable insectary, a provision that is almost indispensable to the successful carrying out of projected experiments.

I am again indebted to many orchardists and others (particularly so to Mr. D. Taggart, The Summit, and to Mr. W. B. Wilson, Cotton Vale) for interesting specimens and material received. It is very gratifying to note the keen interest which is being taken in all matters pertaining to the control of the fruit fly in the Stanthorpe district.

Orchard Notes for September.

THE COAST DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the Southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as if the trees are not in this condition they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weekly growth, the orchard should be manured with a quick-acting, complete manure; such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods in which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

Where necessary, manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 4 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable, passion vines can also be pruned now, as if cut hard back they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed from then till the time the fruit is ready to colour with bordeaux mixture, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Wooly aphis should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit-fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, is it necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the

liquid form for preference. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt it, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness as under-listed were issued in the course of July, 1922:—

Name of Stallion.	Breed.	Period for which Certificate issued.	Owner's Name.	Owner's Address.
Prince ..	Draught ..	Life ..	G. L. Petersen	Oakenden
Nelson ..	Draught ..	Life ..	A. M. Johnson	Blythe Farm, Gracemere
Silvers Royal	Draught ..	12 months	A. M. Johnson	Blythe Farm, Gracemere
Prince of Invermay	Clydesdale ..	12 months	J. McAllister ..	Forest Hill
Pride of the Valley	Draught ..	12 months	F. Zischke ..	Glencoe Grove, Forest Hill
Lochinvar ..	Clydesdale ..	12 months	D. C. Griffiths ..	Mount Forbes
Prospector ..	Clydesdale ..	12 months	Dept. of Agriculture and Stock	Gatton College, Gatton
Mauvenhoff ..	Thoroughbred	Life ..	J. Dalton ..	Ellensfield, Nebo
Windsor ..	Thoroughbred	Life ..	B. J. McGuire ..	Mackay
Malt Bush ..	Thoroughbred	Life ..	A. Shannon ..	Salt Bush Park, St. Lawrence
King-o'-Malt	Blood ..	Life ..	P. J. Frawley ..	Strathpine
Eudois ..	Blood ..	Life ..	Messrs. Neilson and Murphy	Flinders st., Townsville
Pah King ..	Blood ..	Life ..	F. Smith ..	Townsville
Brown Lad ..	Blood ..	Life ..	H. Jannusch ..	Haden
Metrose ..	Blood ..	12 months	W. Ingle ..	Eumundi
Major Marcus	Trotter ..	Life ..	Rees Thomas Ltd.	Townsville
Master Cole ..	Trotter ..	12 months	W. Abrahams ..	Glanmorgan Vale
Sir Butler ..	Pony ..	Life ..	F. Bell	Bolsover st., Rockhampton
Joker	Pony ..	Life ..	Mrs. A. L. Mackay	Pinnacle, Mackay
Trafalgar ..	Pony ..	Life ..	C. Shepperd ..	Mackay
Dandy's Pride	Pony ..	Life ..	B. J. McGuire ..	Mackay
Pinto Ben ..	Pony ..	Life ..	J. O'Sullivan ..	Excelsior Hotel, Rockhampton
Black Pastal ..	Pony ..	Life ..	H. Arndt ..	Tallegalla
Brownie ..	Pony ..	Life ..	J. H. Ruhwedel	Murphy's Creek

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JULY.		AUGUST.		SEPTEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·45	5·6	6·36	5·20	6·7	5·37
2	6·45	5·6	6·35	5·21	6·6	5·38
3	6·45	5·7	6·35	5·21	6·5	5·38
4	6·45	5·7	6·34	5·22	6·4	5·38
5	6·45	5·8	6·33	5·23	6·3	5·39
6	6·45	5·8	6·32	5·24	6·2	5·39
7	6·45	5·9	6·31	5·24	6·1	5·40
8	6·45	5·9	6·30	5·25	6·0	5·40
9	6·44	5·10	6·29	5·26	5·58	5·41
10	6·44	5·10	6·28	5·27	5·57	5·41
11	6·44	5·10	6·28	5·28	5·56	5·42
12	6·44	5·11	6·27	5·28	5·55	5·42
13	6·43	5·11	6·26	5·29	5·53	5·43
14	6·43	5·12	6·25	5·29	5·52	5·44
15	6·43	5·12	6·24	5·30	5·51	5·45
16	6·42	5·13	6·23	5·30	5·50	5·45
17	6·42	5·13	6·22	5·31	5·49	5·46
18	6·42	5·14	6·21	5·31	5·48	5·46
19	6·41	5·14	6·21	5·32	5·47	5·46
20	6·41	5·15	6·20	5·32	5·46	5·46
21	6·41	5·15	6·19	5·32	5·44	5·46
22	6·40	5·16	6·18	5·33	5·43	5·47
23	6·40	5·16	6·17	5·33	5·42	5·47
24	6·39	5·17	6·16	5·34	5·41	5·47
25	6·39	5·17	6·15	5·34	5·40	5·48
26	6·38	5·18	6·14	5·35	5·39	5·48
27	6·38	5·18	6·13	5·35	5·38	5·49
28	6·37	5·19	6·12	5·36	5·37	5·49
29	6·37	5·19	6·11	5·36	5·36	5·50
30	6·36	5·20	6·10	5·37	5·35	5·50
31	6·36	5·20	6·9	5·37	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

			H. M.
2 July	☾	First Quarter	8 52 a.m.
9 „	○	Full Moon	1 7 p.m.
17 „	☽	Last Quarter	3 11 p.m.
24 „	●	New Moon	10 47 p.m.
31 „	☾	First Quarter	2 22 p.m.

Apogee on the 15th at 3.24 a.m.
Perigee on the 27th at 1.30 a.m.

About 8 o'clock in the evening of 29th July the apparent nearness of the Moon and the giant planet Jupiter low down in the west will form a very interesting spectacle; there will be an occultation of Jupiter about 9 o'clock.

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8 Aug.	○	Full Moon	2 19 a.m.
16 „	☽	Last Quarter	6 46 a.m.
23 „	●	New Moon	6 34 a.m.
29 „	☾	First Quarter	9 55 p.m.

Apogee on the 11th at 6.54 p.m.
Perigee on the 24th at 5.42 a.m.

During the evenings of 14th, 15th, and 16th August the planets Venus and Saturn will, with Eta Virginis, a second magnitude star, form an interesting group in the north-west.

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6 Sept.	○	Full Moon	5 47 p.m.
14 „	☽	Last Quarter	8 20 p.m.
21 „	●	New Moon	2 38 p.m
28 „	☾	First Quarter	8 40 a.m.

Apogee on the 8th at 4.12 a.m.
Perigee on the 21st at 3.36 p.m.

About 3 o'clock on the afternoon of 30th September a pair of binoculars should afford a view of the Moon and a third magnitude star—Beta Capricorni. In the course of an hour the star may be seen in a small telescope to disappear suddenly on the eastern side of the Moon and reappear on its western side.

The planet Venus will be at its greatest height in the western sky on 15th and 16th September.

The Great Australian Solar Eclipse will occur on 21st September between a few minutes after 3 p.m. to about a quarter past 5.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]